DOCUMENT RESUME

ED 207 859 SE 035 781

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|---|---|
| AUTHOR | Clark, Richard C., Ed. |
| TITLE | A Portfolio of Energy Ideas: Social Studies. |
| INSTITUTION | Minnesota State Dept. of Education, St. Paul. |
| SPONS AGENCY | Minnesota State Dept. of Natural Resources, St. Paul. Environmental Education Board.; Minnesota State Energy Agency, St. Paul. |
| PUB DATE | Jan 81 |
| NOTE | 93p.; For related document, see SE 035 780. Contains occasional colored pages which may not reproduce well. |
| EDRS PRICE | MF01/PC04 Plus Postage. |
| DESCRIPTORS | Activity Units; Conservation Education; Elementary Secondary Education; *Energy; Energy Conservation; *Environmental Education; *Social Problems; *Social Studies; *Teaching Guides; *Units of Study |
| IDENTIFIERS | *Energy Education |

ABSTRACT

Presented are 12 social studies units which examine current energy issues and present energy dilemmas for careful study and reflection. The activities emphasize: (1) a range of teaching strategies; (2) problem identification, problem solving, and problem analysis; (3) futures education; (4) students as active learners; and (5) consideration of the thoughts, feelings, and attitudes which the energy situation evokes. These teacher-oriented materials include an overview of each unit, background information, teaching strategies, follow-up activities, evaluation questions, resource materials, and other useful information. Students use brainstorming, large and small group discussion, questionnaires, values clarification techniques, and other similar strategies to examine different energy-related issues. Some of these include lifestyles, social obstacles, laws, media, conservation, energy dependency, alternative energy sources, and regulations. (Author/DC)

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# A PORTFOLIO OF ENERGY IDEAS

## SOCIAL STUDIES

**A COOPERATIVE PROJECT INVOLVING:**

- **MN. DEPT. OF EDUCATION**
- **MN. ENERGY AGENCY**
- **MN. ENVIRONMENTAL EDUCATION BOARD**

SE 035 781

# A BRIEF USER'S GUIDE

**INTENT:** These materials are not recipes for science energy education. If their purpose could be reduced to a single statement it would include a comment about an essential and difficult task of science education: helping students learn how to turn science questions/problems about energy into experiments. So, these materials deal with learning about what a problem is, using and acquiring skills of investigation and the kind of reasoning that one does in science.

These units are only part of the science-energy education answer to the present and emerging energy dilemma. They focus on subject-matter knowledge about energy and on the logic and strategy of problem solving within science.

**THE UNITS:** 10 in number. . .teacher focused. . .a detailed summary which describes problems and activities is found at the beginning of each unit. . .appropriate grade levels and classes are indicated. . .possible learner outcomes and general goals are suggested. . .teacher background and an array of suggested teaching strategies are included. . .diverse learner strategies — small-group discussion, larger group discussion, research, classroom experiment, demonstrations — are used. . .student data sheets are provided where appropriate. . .suggested evaluation questions are included. . .each unit has a list of resources on which the activity is based or which you may find useful to have in your classroom.

Edward Hessler



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## TRIALERS

Special thanks to the teachers and students who trialed these materials and contributed to their survival and who helped improve them.

## SPONSORS

A cooperative project of the Minnesota Energy Agency and the Minnesota Department of Education with the assistance of the Minnesota Environmental Education Board, a unit of the Department of Natural Resources.

January 1981

# HI!
# (ANXIETY)

## SUM/MARY

There is a tendency in energy education curriculum materials, including many of these, to deal with issues of energy as unproblematic, unthreatening, completely resolvable through mechanisms of the economic marketplace or the courts or some kind of simulated proceedings.

This material is an acknowledgement of real difficulty but certainly not an answer to it. The complexity of the energy issue must, from time-to-time, contribute to feelings of inadequacy, frustration, of being whelmed over by material that is inherently difficult. For kids, it raises questions of lifestyle: will we have to change, how much, and how come my generation is (or appears to be) responsible for solving the excesses of earlier generations?

# HI! (ANXIETY)

## BACK/GROUND

A (the?) central, emerging issue in the energy debate is how to cope with the uncertain, the unexpected, and the unknown. There are so many things about energy that are uncertain: the price and availability of imported petroleum; the social, environmental and economic effects of an emphasis on nuclear and/or coal and/or a mix of these with solar, wind, biomass and other alternative technologies; the impacts of deregulation of domestic petroleum production; the effects of an oil cutoff.

A phrase which emphasizes these uncertainties is beginning to creep into articles and discussions of energy. It is one that we have seldom heard articulated in public discussions about energy. It is one that is very hard for many of us to admit. Sometimes it is a little scary. It is also hardly impersonal. We are beginning to hear that "we will have to learn to live with more uncertainty."

The future, any future, of course, has been, is, and always will be tinged with varying degrees of uncertainty. A principal feature of the future is its basic uncertainty. However, until recently, at least as far as the general public has been concerned, we have had an assurance about energy that suggested growing inexpensiveness, safety, general availability, and predictability (a few barrels either way). We still receive these assurances from many quarters but, as energy issues have become more politicized, there has been the growth and enhancement of what Professor Luther Gerlach of the University of Minnesota, calls a "lingering uncertainty."

The uncertainty associated with dependable energy supplies is beginning to influence our ideas of what successful human settlements are as well as what the future "quality of life" might be like. Settlements, particularly in the United States, show a remarkable dependence upon one energy type: fossil fuels, a resource that is not, in human terms, renewable. Successful human settlements

are those which offer choices, e.g., freedom to choose from a variety of living environments, freedom to work, and freedom of movement. These choices are surprisingly energy dependent although their degree and range is variable.

## ACTIVITY

Have the class brainstorm a list of energy uncertainties. You might ask a question similar to the following: "What do you think are the worst energy uncertainties which face young people/students today?"

This brainstorming activity can be done with your entire class or in small groups of 4-6 persons. Each group should have a large sheet of newsprint and a marking pen. After each group has completed its brainstorming, the sheets should be posted on the walls so that the class can see the results.

Such a list of energy uncertainties is likely to be quite diverse; e.g., accumulation of carbon dioxide in the atmosphere if we shift from oil to coal; technical blunders; inflation; fewer choices of all kinds; more government control; more rules; etc.

**Rules for Storming the Brain**

1. One person records **all** ideas, including own.
2. All ideas are acceptable; the more the merrier.
3. No evaluation, e.g., "That's a good/bad idea," "Right on!"
4. No commercials or explanations, e.g., "That idea is useful because..."
5. Brainstorming is often a peak (ideas are coming faster than they can be recorded) and valley (quiet dominates) experience. The quiet periods are often followed by another rush of ideas. You will have a sense of when it's over.
6. Teachers, obviously, can and should contribute but not dominate.
7. Editing/deletion of duplicates can occur afterwards.
8. The purpose is to record many ideas in a short period of time.

After the brainstorming divide the class into small groups and assign each group one or more energy uncertainties. Each group is to respond to the items listed in the following chart. When they have finished ask a spokesperson from each group to report the results to the class. How were they resolved: voting? majority rule? leader decided? Consensus.

## AFTER/WORDS

1. If your parents had been asked the same question when they were your age, would they have listed the same kinds of items? How would their list have been different? What about your grandparents?

2. What kinds of energy problems/uncertainties do we have control (or more control) over?
   - Science
   - Technological
   - Educational
   - Social
   - Political
   - Legal
   - Environmental
   - Personal?
3. Do you think science and technology do more good than harm in solving the energy dilemma? What are some of your reasons? Can you give some examples?
4. Do you think that we will be able to solve our energy problems? What are some examples that lead you to believe that?
5. What do you predict will be the most significant energy change in the next 10 years? 25 years? 50 years? 100 years? Why do you think the world of 10 years, 25 years, 50 years, 100 years from now will change in the way you predict?
6. From an energy point-of-view what is most scary about the future? What do you think can be done to make it less scary?

| Energy Uncertainty | Will increase (I), decrease (D), remain the same (S) in our lifetime | This is a Science (Sc), Technology (T), Social (So) Personal (Pe), Economic (E), Education (Ed), Environmental (En), Political (Po), Legal (L) Problem | Rate the uncertainty on a scale of 5 to —5 (Extremely Serious to Not Serious) | Some Results of This Uncertainty are | Do You Think These Results Will Happen? Y = Yes N = No NS = Not Sure | The Effect of These Results Will Be G = Good B = Bad ND = No Difference |
|---|---|---|---|---|---|---|
| | | | | | | |

# SOCIETY:
# DELIBERATE(ING)
# ENERGY
# CHANGE

## SUM/MARY

This activity is based on a short opinionnaire. The items represent some points-of-view about some social obstacles on the road to conservation. Energy waste is one thing; stopping such waste is quite another. The activity brings to our attention the resistance of society to making a major shift in attitudes. The purposes of this activity are to:

(1) help in creating awareness of the obstacles to conservation,

(2) help in clarifying personal points-of-view.

# SOCIETY: DELIBERATE(ING) ENERGY CHANGE

## BACK/GROUND

One of the early analytic frameworks adopted in sociology was the idea of a society. The relevant idea of a society was that of a bounded social arrangement that encompassed institutional relationships, e.g., kinship, religion, economics, legal and political systems. In Europe, sociology was to be the science of societies: of their properties as total systems and of the changing relations between each system as a whole and its major parts. It became the basis for the identification and characterization of the principal institutions, the specification of their interrelations and explanations on the emergence of one form of society from others.

In the United States, on the other hand, there was an interest in all of these topics but sociology came early to be understood as the study of social relations. Societies were but one form of such relationships. People have arrangements for doing things. Some of these are planned, but most are not. What determines the way people are organized? What are the consequences of being organized in one way rather than another? What, in given circumstances and for given purposes, is the most advantageous way to organize a nation, a department store, a marketing system or a movement? Or a society?

One of the most important social changes of our time is the emergence of a range of processes and planning for direct and deliberate change. In the United States, we value most highly our democratic pluralism. When conflict arises what kind of societal knowledge base would be sufficient on which to make a decisive appeal? Are we inherently incapable of being goal-oriented for basic ideological reasons? What are some social obstacles to stopping waste in energy consumption?

# ACTIVITY

## A Teacher/ing Note—A Complete How To

1. Duplicate the opinionnaire.
2. Read the directions to your class. Emphasize and clarify all the directions.
3. Have the students mark the questionnaire. This may be done individually, or you may wish to experiment with responses elicited from small groups. Each group (4-6 students) would discuss the ideas and decide upon a group response (majority, consensus?) to each item.
4. Tally the responses on the chalkboard. "How many marked 'approve' for item #1?" etc. If the papers are anonymously exchanged, students may feel less sensitive about responses. You may want to calculate percentages. If you have 26 students in the class and 10 of them "agree" for an item, then: 10 ÷ 26 x 100 will equal the percentage; that is, 10 ÷ 26 is .384615 which you round off to .38, multiply it by 100 and this equals 38%. If you use this activity in more than one class you can compare responses and also work out overall percentages.
5. Once tallied, the discussion can begin. These are some suggestions.
   - What are some of the reasons for particular opinions? How are they similar or different?
   - Above all else, to really work, does energy conservation require a government policy that vigorously promotes conservation? Why or why not?
   - When you hear about conservation of energy which of the following most accurately reflects your thoughts and attitudes? Energy conservation is:
     - a. Curtailment: energy savings are forced by interruption of supplies; results in unemployment, rationing and severe cutbacks.
     - b. Overhaul: dramatically changing the way we work, live, pursue leisure; outlawing suburbs and forcing people to live in certain places.
     - c. Adjustment: learning how to use less energy than we have normally used to heat houses, manufacture items, travel.
   - There are many alternative energy resources — wind, solar, coal, atomic, gasohol, geothermal, peat, etc. Have you ever thought about conservation as an alternative energy resource? What are some ways that it would help if we did? Would it help us to make better comparisons between the economics (payback period; savings in barrels of imported oil), safety and quality of conservation with those of another alternative?
   - What is the difference in cost between an automobile that gets 13 miles to the gallon and one that gets 37 miles to the gallon in a year? What is the difference in energy savings between the two for the same time period?

- Each of us can contribute to energy savings. Together these individual acts can add up to a lot. Divide your class into small groups and present them with the following problem: You have just been assigned to the School Energy Conservation Committee. What recommendations would you make to help motivate everyone who is in school — students, teachers, administrators, employees — to participate in energy conservation efforts and to contribute to energy savings?

  Discuss the recommendations. Try to separate them into those that are coercive and those that reward energy savings. Are the two lists about the same length? Which do students think are more likely to work? Why?

  - If your school was told each month how it was doing on the energy savings task do you think that would be a useful recommendation? What do you think might happen as a result?
- When scientists try to solve some of this nation's energy problems, do you think they make matters better or worse? Give some examples. What about government? Business and industry?
- Who controls actions such as eliminating major energy waste in homes, industry, the area of transportation and business? Who should control them? If that didn't work, then what?
- Give an example of a common product no one really needs. How many agree with you? How would we get rid of it? Which of the following is the least popular area of conservation
  a. the automobile,
  b. forsaking clothing fashions,
  c. lowering thermostat to 65°F,
  d. closing shopping centers on week-ends?

  What are some reasons for your choice?
- Is severe punishment (What kind would it be? Fines? Jail?) an effective way of controlling energy consumption? Who would decide? How would it be regulated? Can you suggest an alternative?
- List three energy conservation steps we can take as a society which are reasonably noncontroversial. List three energy conservation steps which are controversial. What would you suggest we do to promote just one of the controversial ones?
- Develop an advertisement which effectively advocates a particular conservation method. Get 5 opinions on it: from a teacher, a student, a relative, another adult and your closest friend. Is it effective?
- Which item in "Some Social Obstacles to Conservation" do you think is most ambiguous? Least ambiguous? How many agree with you?
- Rank order the top five on the list from most effective (1) to least effective (5). Rank order the bottom five on the list from least effective (0) to somewhat effective (4). Tally the class responses. How much variability is there in the outcomes? Use a histogram to show the results.
- Do you believe that energy use and economic growth are closely related, that is, that energy consumption encourages economic growth and that encouraging conservation would severely depress economic growth? Why or why not? What evidence do you have that your belief is correct or not?

**THANKS!**

This activity is based on, and items 1-18 on the student sheet have been adapted from, "The Road to Conservation: Some Social Obstacles" by James Titus, **Human Ecology Forum**, Winter, 1978. Used with permission.

# SOME SOCIAL OBSTACLES TO CONSERVATION

## Student Sheet

Directions: Each statement describes a possible societal condition which represents a barrier to conservation. For each statement mark on the left-hand column with an X or a check whether you agree or disagree. In the right-hand column note whether you think it will change or will not change even if it seems obvious what the response is.

| Agree | Dis-agree | | | Will Change | Will Not Change |
|---|---|---|---|---|---|
| ____ | ____ | 1. | When you try to get a whole society to act, its members have to act in concert. Otherwise, if I save energy and you don't, the difference bothers me, I get angry and quit saving. | ____ | ____ |
| ____ | ____ | 2. | We know the skills needed for energy efficiency, but the whole force of our society has been in the other direction, the excessive use of energy. | ____ | ____ |
| ____ | ____ | 3. | It's clear that people from all over the country are not convinced they need to reduce their energy use. Everything in our culture has led them to act in a different way for the last fifty or sixty years. | ____ | ____ |
| ____ | ____ | 4. | The needs of families are too diverse for the idea of one-energy-policy-for-everyone. Whatever controls are adopted should be introduced at the level of institutions in the society — business, industry, transportation, and the like — and they must allow the autonomy of those responsible for the family's well-being. | ____ | ____ |
| ____ | ____ | 5. | If we ration energy, I worry about mobility, because for some people the car means a livelihood; others can do without it. The federal government may not have the capacity to make that distinction by law. | ____ | ____ |
| ____ | ____ | 6. | We should provide all kinds of incentives to reduce the number of cars used for getting to and from work. Fast lanes for buses. Subways, car pools. Those are the things that will make for a much saner society. | ____ | ____ |
| ____ | ____ | 7. | The less time we spend alone in cars and the more time we spend with each other, the healthier we'll be. | ____ | ____ |
| ____ | ____ | 8. | Policy makers, whether from government or the private sector, have to consider what the energy policy will do to families and to those who care for families. It must bring the family back as a responsible, coordinating unit that will conserve energy. | ____ | ____ |
| ____ | ____ | 9. | We have to make sure that the people who don't get the heat and the light are not the poor. We have to make sure that public transportation, which the poor depend on, does not break down. The situation of the poor in the United States is the weak point, whatever the crisis. | ____ | ____ |
| ____ | ____ | 10. | Although communes have problems, they are models of the future. They share. They conserve. People living communally are witnessing a way of life we all need to have. We need to share more, to give up some of our individuality and freedom for the greater good. | ____ | ____ |
| ____ | ____ | 11. | We have to change our values, we have to shift from acquisition and hoarding to sharing, either by necessity — you share or you don't have — or by not rewarding people for accumulating. | ____ | ____ |
| ____ | ____ | 12. | To many, the big car remains an object of envious adoration, and everywhere Americans still keep up with the Joneses. For their part, the Joneses seem to be going off on weekend trips in a gas-guzzling station wagon at 65 mph. | ____ | ____ |
| ____ | ____ | 13. | While we lose sleep about keeping our thermostats at 65° during the savagery of Minnesota winters, absolutely unnecessary air-conditioners continue to churn in the beach hotels of Waikiki, and thousands of factories crank out products no one really needs. | ____ | ____ |

| | | | | |
|---|---|---|---|---|
| ___ | ___ | 14. | According to a recent Harris poll, more of us believe in "scientific research" to solve America's future energy problems than we do in "hard-working Americans." | ___ ___ |
| ___ | ___ | 15. | We reward people for accumulating. We strive to acquire things. Work and money are the most important factors in our lives. | ___ ___ |
| ___ | ___ | 16. | Young people may be able to project into the future and say they are going to organize their lives differently and not depend so much on energy. | ___ ___ |
| ___ | ___ | 17. | It's possible that young people who are crazy over cars will put some of their ingenuity into creating more efficient cars but it is doubtful that it will happen. They wouldn't get the kind of recognition for efficiency that they do for sleek, powerful cars. | ___ ___ |
| ___ | ___ | 18. | It is hard to adapt to labor-intensive, energy saving activities. Energy saving ways of acting are expensive in terms of time. | ___ ___ |
| ___ | ___ | 19. | I know all I **care** to know about energy conservation. | ___ ___ |
| ___ | ___ | 20. | America simply does not yet believe that the oil supply is finite and that other energy sources cannot take up the slack. | ___ ___ |

## RE/SOURCES

Human Ecology Forum; A Magazine for the Human Services. (Box 27, Roberts Hall, Cornell University, Ithaca, New York 14853. $1.50, $6.00/year).

Stobaugh, Robert and Daniel Yergin. 1979. Energy Future: Report of the Energy Project at the Harvard Business School. Random House, New York ($12.95).

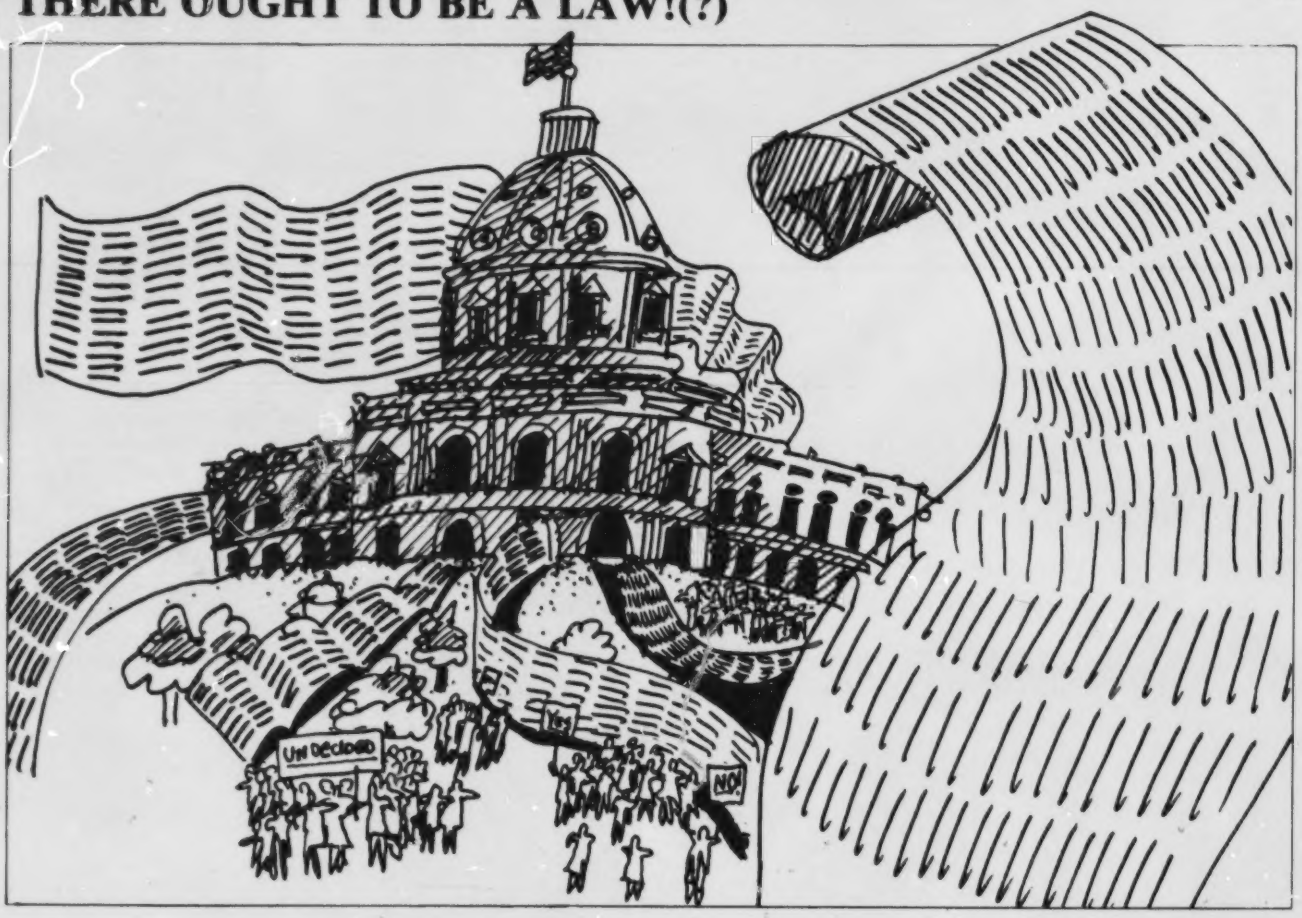
# THERE OUGHT TO BE A LAW

## SUM/MARY

In this activity, an assumption is made that it will be necessary to legislate controls over personal energy use in order to extend the end-date of fossil fuels as far into the future as possible. It is assumed that education in order to achieve voluntary conservation will not be effective enough, soon enough. Students review a list of energy uses proposed for legal control, and rank them in the order they should be introduced as bills. The order will be arrived at by deciding which individual rights vs. group rights will be affected by each action and, next, which rights will take what precedence over other rights. The primary purpose of this activity is to help students identify their own values.

# THERE OUGHT TO BE A LAW!(?)






## BACK/GROUND

In a democracy, decisions to legislate away personal freedom are hard to arrive at. We do not make such decisions easily, and, when we do, it is usually in response to a crisis. A more palatable solution to energy misuse would certainly be education of our citizens so that they would voluntarily agree to curb their energy use in ways that meet their own values criteria.

Let's say that the energy situation is a crisis, and let's say that education will take too long to bring results. Let's say that we have to pass legislation to declare certain uses of energy illegal. How do we decide among the range of human rights/needs/wants, and place a higher value on some? How do we decide that a job takes priority over recreation? Do we even understand that priorities are implied in ranking behavior?

# ACTIVITY

In this activity, students are given a list of energy uses that have been suggested for including in legislation which will mandate personal energy conservation. Some additional spaces have been provided on the data sheet so that you and your class can add other examples of proposed legislation. Students are in control of which uses will become illegal first and which last. They will rank the list as individuals first, but finally try to arrive at a group consensus. As students make decisions about limiting the personal freedom of themselves and their fellows, they will explore the value(s) at issue in each suggestion, and discuss what should be viewed as more important and necessary and for what reasons.

The data sheet lists a group of energy uses which will be included in energy conservation legislation. Tell your students to rank the list in such a way that the least valuable uses are legislated away first, and the most valuable, last. In order to decide about first and last, students will need to understand what individual right or need is at stake in each energy use. Then they will need to make a judgement about which right/need is to be ranked as more important than which others.

**First.** Have the class read the list and add items to it or delete items from it. Everyone should write the suggested additions so that all are working with the same list.

**Second.** Have students quickly rank the list of energy uses by reading each item and making a quick decision about the value of each use. Column 1 is to be marked this way: Write in a 1 if you feel the energy use could be quickly dispensed with; write a 2 if you feel the use would be important to allow as long as possible; write a 3 if you feel the use is necessary enough to make it among the last to go. These numbers are, of course, very arbitrary.

**Third.** Study each energy use and try to decide what human right/need/want is at stake in each item. Mark Column 2 according to your decision. Use these letters to identify what is at stake: L-making a living; H-health; S-safety; R-recreation; C-comfort and convenience; E-esthetics and natural beauty. There may be some overlap, e.g., between health and recreation. Decide which is primary, or use both letters.

**Fourth.** In small groups compare your lists and try, through discussion, to come together on the choices wherever possible. Don't change your rank unless you've changed your mind!

**Fifth.** Now that you've discussed the value of the uses listed, you will probably make some changes in your ranking. To rank the choices in Column 3, use the same instructions that you did for Column 1. Disagree with the group if you do.

## THERE OUGHTA BE AN ENERGY LAW!(?)

### Data Sheet

| 1. I Feel | 2. At Stake | 3. I Changed | Energy Uses Suggested For Conservation Bills |
|---|---|---|---|
| ( ) | ( ) | ( ) | Sunday and holiday driving limited to necessary trips only. |
| ( ) | ( ) | ( ) | Space air conditioners limited to hot climates only — none allowed in Minnesota. |
| ( ) | ( ) | ( ) | Auto air conditioners limited to hot climates only — none allowed in Minnesota. |
| ( ) | ( ) | ( ) | Self-cleaning ovens will be illegal. |
| ( ) | ( ) | ( ) | Self-defrosting refrigerators will be illegal. |
| ( ) | ( ) | ( ) | All indoor swimming pools will be closed unless solar heated. |
| ( ) | ( ) | ( ) | All indoor swimming pools will be closed except those designed for health and for educational uses. |
| ( ) | ( ) | ( ) | No automobiles getting less than ____m.p.g. will be allowed. |
| ( ) | ( ) | ( ) | Higher rates for greater electrical energy consumption will be charged. |
| ( ) | ( ) | ( ) | Only one car per family will be allowed. |
| ( ) | ( ) | ( ) | It will be illegal to own/operate gasoline-powered lawnmowers on resident lawns. |
| ( ) | ( ) | ( ) | It will be illegal to own-operate snowblowers. |
| ( ) | ( ) | ( ) | No Instant-on TV will be allowed. |
| ( ) | ( ) | ( ) | No more small electrical gadgets will be allowed: Canopeners, knives, toothbrushes, shaving cream warmers, individual hamburger fryers, waterbed heaters, etc. |
| ( ) | ( ) | ( ) | All non-emergency use of ORV's will be discontinued: motorcycles, snowmobiles, motorboats, etc. |
| ( ) | ( ) | ( ) | It will be illegal to operate ski tows. |
| ( ) | ( ) | ( ) | |
| ( ) | ( ) | ( ) | |
| ( ) | ( ) | ( ) | |

## AFTER/WORDS

1. Which laws would curtail personal freedom the least? Which the most? What are some reasons for your decisions? How serious are these limitations on freedom of choice?
2. Which energy use ranked first? What are some reasons for these rankings?
3. How do we decide that it is better to manufacture necessities than luxuries or goods to help us have fun?
4. Are there any alternative ways of accomplishing some of these things that are reasonable for many/most people?
5. By limiting one person's recreation possibilities it is likely that this will limit another's way of making a living. What are some things that can be done about that?
6. Which of these would force people to change the most? The least?

# OUR ENERGY VALUES OURSELVES

## SUM/MARY

In these four activities students learn about their energy dependency, the energy dependency of adults, develop a student energy conservation guide, and plan an energy conservation week. The four activities provide an opportunity for students to examine the meaning and implications of an "energy quality" lifestyle.

# OUR ENERGY VALUES OURSELVES

## BACK/GROUND

What makes life worth living? What do you most want from it? From what do you get your most complete satisfactions? What is the quality of your life? Do you agree with Dr. Albert Fritsch of the Center for Science in the Public Interest that "a better quality of life must include proper and non-wasteful use of energy"? Does that mean an altered or different lifestyle? Does that include an audit of your present energy behavior? Should you develop a personal guide to changing behavior?

## ACTIVITY

### STUDENT ENERGY EXPENDITURES

Have the class identify, by brainstorming, all the ways that they have expended energy for a day or a week. Encourage specificity ("Drove to shopping center for a toothbrush "; "Left TV and light I was using on while I was outside playing basketball with my friends."). Recording these will be a challenge!

Small groups of 4 to 6 around a table also work very well. Each group should be equipped with several large sheets of newsprint and a marking pen. If you use small groups, the lists should be posted so that everyone in the class can examine them.

**MATERIALS FOR STORMING THE BRAIN**

Chalkboard

Newsprint

Overhead Projector

Person (usually the teacher) or persons to record the ideas. Two people if the class is large (45-60)

**RULES FOR STORMING THE BRAIN:** Review them with your class. The purpose of brainstorming is to record many ideas in a short period of time.

a. Record **all** ideas. (Don't be afraid to encourage a reasonable amount of wild ideas, humor.) You can include some possible energy expenditures but be careful not to dominate. It is possible that your students may look to you for the "right" answers.

b. No discussion of the ideas. No clarification.

c. No evaluation, at all. None! ("Hey, that is a good idea" or "Wow, that's weird, man" are **not** allowed).

d. Expect repetition of ideas. Record **all** ideas. Nothing kills productive brainstorming faster than when someone's idea is not recorded.

e. Expect periods of silence. They often lead to a flurry of new ideas.

f. In brainstorming, spelling is not important.

**AFTER THE (BRAIN)STORM**

A. Ask students to:
- draw a line through any items that shouldn't be part of an energy quality life
- circle all items that should be de-emphasized for an energy quality life
- box all items that should receive more emphasis in an energy quality life

B. If groups have worked on the lists ask each for a brief report. After the group reports, ask the class for any suggestions for additional items and add them to the listing.

Do your students feel that the scope of student energy use has been reasonably well-revealed? Why/Why not?

C. The class may have had a tough time deciding what constitutes an energy quality life. The answer is not easy. It is a question of how we should live. There are many competing opinions. Help them to think about the implications and dimensions of an energy quality life.
- Does it mean restriction? What kinds?
- Does it mean coercion? More rules? More authority? Relaxed regulations on automobile or coal-fired plants? Smaller cars?
- A better environment? Or a poorer one?
- Can society go on as it was before?
- Does it mainly mean getting rid of "gas-guzzlers," walking or riding a bus to school, spending more time in self-contained communities?
- Shopping less frequently?
- Increasing use of local recreation facilities?
- Doing more things by hand, e.g., mowing the lawn, mixing batter, shoveling snow, brushing teeth, mending clothes? Does this mean more/less human physical drudgery?
- Wearing more and warmer clothes in the winter?
- More/less/about the same technology?
- Closer family/personal relationships?
- Will health improve or decline?
- Will leisure time increase or decrease?
- An improvement in quality of goods and services?
- More local food production? More people involved in it?

- More/less honesty, integrity and mutual trust in human relationships?
- Changes in consumer protection? For the better? For the worse?
- Making more decisions about what is essential and what is peripheral in energy needs?
- Will it increase or decrease
  - a sense of human welfare
  - a sense of achievement
  - a sense of participation
  - a sense of equity?

D. When you are finished with this discussion of an energy quality life ask each student to respond to the following incomplete sentences. There is no need to discuss them. You can ask kids if there are any responses that they would like to share.

I learned that I _____

_____

I wish that _____ would _____

_____

I think an "energy quality life" means _____

_____

I will _____

_____

I urge _____ to _____

Who will decide _____

# ACTIVITY

## ADULT ENERGY EXPENDITURES

Have kids act as the recorder while they brainstorm with adults (parents, friends) a listing of a day or a week's energy use. Be sure to review the rules of brainstorming with your students. Emphasize that the results will be kept anonymous!

- draw a line through any items that shouldn't be part of an energy quality life,
- circle all items that should be emphasized for an energy quality life,
- box all items that should receive more emphasis in an energy quality life.

Make master lists of responses to the energy quality of life responses. In what ways are they alike and in what ways are they different from the student responses? What energy problems do they present? What are some suggested solutions to these problems?

# ACTIVITY

## AN ENERGY CONSERVATION CHECKLIST FOR TEENAGERS — BY TEENAGERS

Energy is used (and misused) in so many ways that it staggers the intellect and the imagination. Its use and waste depends on many factors. Lifestyle is one of these. There are quite literally dozens of energy checklists — home energy audits, appliance use, entertainment practices, residential lists, energy tips — all of which are designed to encourage an energy conserving ethic. There are few, if any, student-developed energy conservation guides.

Challenge your class to put a conservation checklist together for teenagers that deals in meaningful ways with energy conservation and management. It is important that you discuss whether such an idea is worth trying at all. This is an excellent small group activity.

Obviously, such a listing can take many approaches.

- Some lists try to motivate more by guilt than anything else, perhaps especially those that take a prescriptive approach. Should such an approach be avoided or emulated?
- Do students want to develop a yes and no checklist that encourages teenagers to inspect their energy behavior? After student users tally the "yes" and "no" answers — the "no" responses probably indicate energy problems — students could then decide where to begin.
- Perhaps the list could be a set of proposals to improve the energy environment and diminishing their impact upon the earth's energy resources. Kids could then test their commitment to improving their energy lifestyle by writing the letters, A (Already do), W (Willing to do), R (Refuse to do), I (Inconvenient to do), beside each proposal. After completing the list, teenagers might be asked what they said they wouldn't do and decide why they wouldn't do it.
- Do students want to provide a space in their audit for a "to do" list of energy saving measures? If they do, are they expected to stick to them?
- Or...? (Some lists are heavy on kWh information, BTU's, hours of use, etc. You have some options.)

When the student guide is completed (it needs a title!) ask some people what they think of it. What is the response? Is it a good idea? Do they agree with your guide? Disagree? Is it useful? Does it need to be revised? You have been invited to speak to the Minnesota Energy Agency on the topic: "Teenagers and Energy Conservation." Write an outline of your speech.

# ACTIVITY

## ENERGY WEEK

Plan an Energy Week in which everyone in the class has to cut back on some aspect of energy use for each day. The following is only an example. Have the class devise a plan and do it. ON

| | |
|---|---|
| Monday - | transportation: walk or bike more, ride car ____% less; |
| Tuesday - | heating: cut back room temperature by ____%; |
| Wednesday - | appliances: toaster, dishwasher, dryer — don't use; |
| Thursday - | lighting: keep lights off ____% of time; |
| Friday - | entertainment: TV, radio, stereo ____% of time. |

After the week ask your students:

- Is this an effective energy consciousness-raising device?
- Does it result in a behavioral change? What kind? Temporary? Semi-permanent? Permanent? How could you find out?
- What did you learn about energy conservation?
- Is energy conservation boring? A chore? A pain? Dumb? Too much trouble? Or is it just the opposite? Does it require creativity? Does it include big, medium and little things?
- Why doesn't energy conservation receive a lot more attention?
- In 25 words or less: How would you solve the energy conservation problem?

## AFTER/WORDS

1. Do you think that it is true, as it is sometimes said, that teenagers and young adults are abusers of entertainment appliances — TV's, radios, stereos, tape players, portable equipment, electric games, projectors, etc.? How could you prove/disprove it? If it is true, how would you reduce this kind of energy use?
   - Is this a value or factual issue? Have you heard it before? From whom?
   - What hypothesis can you develop which could be tested? What are the best questions to ask? Of whom?
   - What sources of information can you identify which may help you decide? People? Books? Magazines? Interviews? Surveys? Personal experience? Other? How reliable are these sources? Which ones are most relevant? What are the points of agreement and disagreement between sources? How do you evaluate the quality of these points of agreement and disagreement?
   - What inferences can you make from the data?
   - If it is true, what solutions do you suggest?
2. To an ever-increasing degree, industry doesn't make and sell energy consuming "things" because people need them; "things" are made and sold because people need jobs in industry.

   ☐ Yes I agree with the statement because: _____

   _____

   _____

   ☐ No, I disagree with the statement because: _____

   _____

Tally the responses from the class. If the answer is yes, divide the class into small groups and have them develop a position statement on what we should do about it. The disagreers will be helpful in the development of that statement.

## RE/SOURCES

Estes, Jane. 1978. American Scene In Spokane: A Pauperish Yet Princely Churchman. Time, November 13, pages 6-7.

Fritsch, Albert J. 1974. The Contrasumers: A Citizen's Guide to Resource Conservation. Praeger Publishers, New York. (Contains a sophisticated "Lifestyle Index...designed to demonstrate how much energy the individual uses each year and how — that — standard of living compares with that of the average individual in other countries of the world.")

Harris, T. George. 1975. Us Fat Cats. Psychology Today. March, page 4.

Home Energy Audit Conservation Guide 1. 1977. Minnesota Energy Information Center. Minnesota Energy Agency, 980 American Center Building, 150 East Kellogg Boulevard, St. Paul, MN 55101. (Telephone: Twin Cities: (612) 296-5175; Statewide Toll-Free: (800) 652-9028).

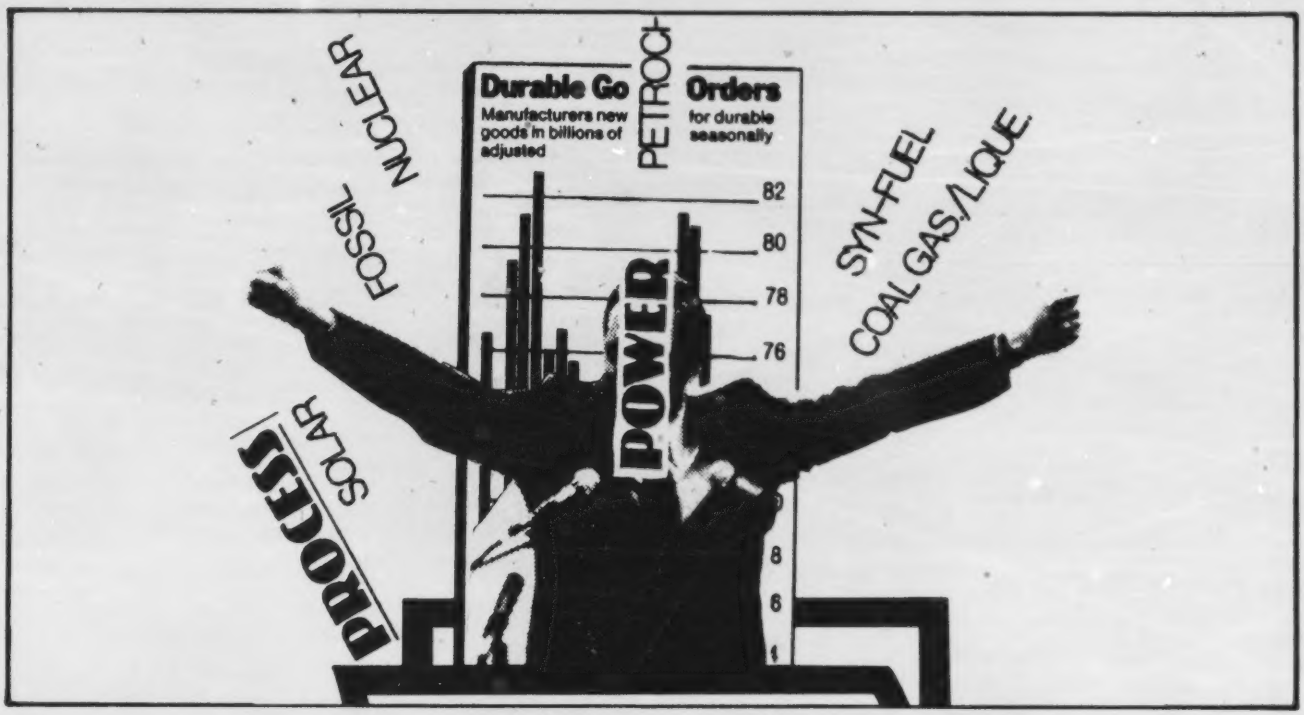
# REFINING THE PRINT

## SUM/MARY

Students analyze newspaper headlines, articles, interviews, cartoons and graphs and tables which deal with energy. The activity provides students with insights into using and understanding newspaper articles dealing with energy and the conflict which surrounds energy issues. It deals with most of the following questions:

- What needs answering?
- What are some of the answers?
- What are some of the issues involved:
    - Government
    - Social
    - Economic
    - Environmental?
- What is the conflict?
- Who are the parties involved?
- What are the goals of each of the parties?
- What values can be inferred from the goals?
- What are the alternative solutions?
- What are some of the implications of those alternatives?
- What are some of the pressures on the decision makers:
    - Political
    - Ethical
    - Legal?

# REFINING THE PRINT




## BACK/GROUND

The newspapers of the world represent a body of literature with important sociological and educational implications. While no single newspaper can match the boast of **Reader's Digest** — "over 30 million copies bought monthly in 13 languages" — a nationally syndicated article, reprinted in hundreds of newspapers,can reach many times that number of people. For many people, newspapers represent an important information source for local, state, national and international news.

Newspapers present many interesting topics to think about: in what ways do bulky editions confront readers with choice; what specific types of content are not carried by the daily press; what are the influences of the beliefs of the publisher on news reporting and editorial opinion; what are the limitations of newspapers in dealing with the mass of details which influence an issue; etc?

These questions are not meant to detract from the newspaper as a source of valuable information. Do the poor pay more for food? What are supermarket codes? What are the impacts of the gasoline crisis? What does deregulation mean and how is it related to excess profits? How are families responding to rising energy prices? What are some of the emerging energy trends? Read a newspaper and learn!

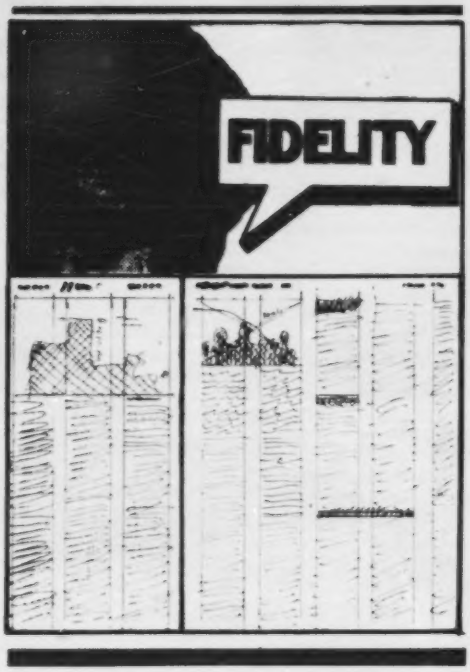
In the large newspapers, many investigative articles are incredibly rich in detail: pictures, text, graphs, interviews, tables, cartoons — each providing explicit and implicit perspectives on the topic. Turn a few pages and you often find another competing opinion. In a few days, letters to the editor provide still other perspectives: all informed and often with quite different points-of-view.

# ACTIVITY

Your students may benefit from doing an analysis of newspaper headlines, articles, cartoons and graphs and tables which deal with energy. Assign them to collect over a period of several days, all the energy news from a newspaper that they can find.

## On Turning A Newspaper Into An Investigation

A Teacher/ing Note




What kind of energy materials to collect from a newspaper can be confusing. One solution is to help students select major energy themes: gasohol, coal, nuclear, conservation, biomass, transportation, economics, energy politics, housing, solar power, etc.

Another solution is to help students select parts of the newspaper which interest them: headlines, cartoons, illustrations, graphs and tables, etc. These can, of course, be related to the major energy themes.

You could also have your class use a special report from the newspaper which deals with an aspect of the energy crisis. This could be an article that you/they have clipped. The advantage of such reports is that they are self-contained, have a definite beginning and ending, cover a variety of issues, and often expose students to a full range of reporting and communication skills: cartoons, illustrations, graphs, tables, and articles written by several different authors. Two possibilities are suggested in the Re/sources section. Perhaps you saved them. If you decide to use such an article, especially a dated one, you will want to consider the possibility of changing facts and opinions.

Such features, because of their length, can overwhelm students. Divide the assignment among your class so that the entire feature is covered. If each of the parts is covered by two (or more) individuals and/or groups, the analysis provided by each will provide interesting comparisons, insights, and take advantage of divergent viewpoints.

If you use the special report approach, ask the entire class to look over the entire feature before they make a more detailed study of its parts. Have them attempt to answer these questions, as best as they can, at the beginning.

What is the problem? In what ways is it,
- International
- National
- State
- Local, including family?

What groups are involved?
- What are the goals of each group?
- What are the values of each group?
- What values of each group are in conflict with the values of the other groups involved?

Who are the decision-makers involved:
- International
- United States
- Minnesota
- Your community
- Your family?

What are some of your alternative solutions to the problem:

- International
- National
- Minnesota
- Community
- Family?

For each alternative what are some pressures and/or influences on the decision makers?

For each alternative what is at least one positive and one negative effect?

For each level, family through international, which alternative solution would you select? What is the main reason that you would select that solution?

These questions will help students discover what the "world" of the problem looks like, what some of the main issues are, what some of the alternatives may be, to select some "best ways" and what some of the implications of the alternatives are.

## A PARTS GUIDE

This section can be used with both a feature article or with a collection of articles on energy. The suggested questions should not be regarded as exhaustive. They suggest some possibilities. The questions are general although, in a few instances, specific "for examples" are included in parentheses.

**Articles**

- What is the author's main idea?
  (What new federal government policy is the author writing about? What is the goal of the policy? Why did the federal government change its policy?)
- What evidence does s/he provide?
  (What data does the author provide that conflicts with the goal of this policy?)
- What values questions are raised?
  (What relationship is suggested between educational level and/or income level? How does it seem to influence people's attitudes toward energy?)
- What are some of the causes? The effects?
- What are some suggested alternatives to the problem?
- What are consequences and implications of the alternatives?
- What is your reaction to the alternatives? Why?
- What groups stand to gain? To lose?
- How would you suggest the problem be resolved?
- What can you and your family do to help resolve the problem?
- When data are available in an article, have students develop a graph/table which shows what the author is writing about.
- What does the author say about people's attitudes? In what ways are they changing? Do you agree? (Develop a questionnaire to check this out.)
- What claims are made in the article? What evidence is given?
- What is government doing about the issue? At what levels? What do you think the government ought to be doing?
- What is business and industry doing about the issue? What do you think business and industry ought to be doing?

- What is the predicted future going to be like? (What is the car of the future going to be like? Do you agree that Americans have a psychological attachment to cars? What evidence can you give?)
- Do two quotes contradict each other? Is it possible that both statements may prove to be correct? Which one do you believe? Does the author have a point-of-view?
- How would _____ affect you and your family? Be as specific as you can.
- What has happened to change a past prediction or a belief? What are the reasons that people held that belief?
- If legislation is mentioned,
  - What provisions in the proposed legislation are doomed? Why?
  - What provisions have the support of both Houses in Congress?
  - How would some key lawmakers like to see the bill changed?
  - What is the reaction of groups, e.g., unions, industries, energy-producing companies, stockholders of energy-producing companies, environmental groups, business leaders, etc., to the proposed legislation? What do they recommend ought to be done? What do you recommend and why?

**Charts, Graphs and Tables**

- What is the source of the data?
- What do you know about the data source? What biases might the data source have? How can you find out?
- How do you identify the variables in a graph?
- What two variables does the graph illustrate? What does the horizontal axis measure? What does the vertical axis measure?
- What trend(s) can you find? Is something decreasing, increasing or staying about the same? What is it? What time is considered by the graph? (How much did energy consumption change for each ten year interval? How do you figure consumption at any time on the graph? What was the energy usage for each ten year interval?) What are some reasons for the change given in the article? (Are the projections more likely to be correct today than they were 10, 20 or 30 years ago? Why?)
- What units are used? Why were they chosen? Do you understand them?
- What correlation does the graph suggest? (e.g., between income and energy use, or income and percent of income required to heat a home?) Is the correlation positive (as one increases the other increases) or negative (as one increases the other decreases)?
- What tentative ideas can you offer for the reason why energy (consumption, cost) increased or decreased in a certain time interval on the graph?
- Based upon the data in the graph and/or table what predictions would you make for the future?
- What variables might influence that prediction?

**Cartoons**

- What is the cartoonist telling you? Do others agree with your interpretation?
- What do the symbols used represent?

- Who owns what the symbols represent?
- What concepts about energy are omitted?
- Develop categories for the cartoon. Does the cartoon represent concern for the environment, concern for the future, concern for consumers, concern for consumer protection, concern for demand on the earth's energy sources, concern for...?
- Does the cartoon suggest a "cause and effect" relationship? What is it? Do you agree or disagree? Why?
- In what way(s), if any, does the cartoon help you think about energy differently or does it only reinforce?
- What conflict is represented in the cartoon?
- Rate yourself on the following "mirth spectrum": negative response, no response, half-smile, smile, chuckle, laugh. Tally the responses from the class. Look for common patterns and try to see, without being "too heavy" about it, what it is that elicited the responses. What made people laugh? What didn't make people laugh?
- Does the cartoon say anything about us as individuals or groups or nations or as a society that we tend not to say openly?
- Are cartoons better than photographs? Why? Why not?
- Does the cartoon's "message" depend on your having learned certain things — that is, do you suppose a mainland Chinese person would get the same message you get from the cartoon?
- Do other members of your class get the same message?

**Headlines**

- Do they communicate the meaning of the article?
- How good are they?
- Where do they fail?
- Do they bias you?
- Do the headlines inform?
- Do newspaper writers give you cues in headlines to help you realize a meaning? Does s/he depend on your background?
- Do the headlines attract your attention?

**Interviews**

- Does the person feel optimistic or pessimistic about the energy future of the United States? Does s/he provide any evidence? What is it? Do you agree? Why?
- What role does the person think government should play? Economics or the marketplace? Concerns of environmentalists? Business and industry? What foreign policy suggestions are made?
- How will the energy crisis be solved? Technology? Alternative energy sources? Lifestyle changes? New discoveries? Energy self-sufficiency? Why is it the best solution?
- What does the person believe is the best way to accomplish the goal of solving the energy crisis? Who agrees with the suggested solution? Do you agree? Do you think others would agree? How would you find out?
- Does the person talk about sacrifices? What kind are they? Who has to make them? What suggestions are offered to help those most affected by these sacrifices? Do they make sense?
- Does the person suggest any of the difficulties and/or implications, both positive and negative of the solutions s/he proposes? What ones can you think of?

- What does the person say about how we got into this mess? How bad is it? Does s/he blame someone? Who? What are the reasons?
- What one question do you wish the interviewer had asked?

**Photos**

- What size?
- What is their quality?
- Are they worth "a thousand words"?
- Write out what you think of them. Do they help you understand an issue? What mood or feeling do they set? What do they emphasize? Is there an attempt to convince you of something?
- Do they engage your curiosity?
- Do they support the main idea of the article?
- If you looked only at the photographs what kind of general conclusions would you be inclined to draw?

## AFTER/WORDS

1. Many people like to say "The only thing I know about energy is what I read in the newspapers." How good do you think newspapers are as an information source? In what ways could newspapers improve their reporting about energy?
2. The following material is particularized and focused. You can use it as is but please use it as an example to generate some of your own probes into analyzing and better understanding newspapers and energy events.

   You are the editor of a large newspaper. A new poll shows that by 59 - 34% the public rejects the concept that nuclear power is too dangerous to permit continued expansion.

   a. On what page will you run the poll results?
      ____ 1. Front page
      ____ 2. Page 3A
      ____ 3. Page 4, Section B, where you have been running a series on farm energy
      ____ 4. Page 28A
      ____ 5. My choice: _____

   b. What will be the headline you use with the story?
      ____ 1. "Majority Now Favors Nukes"
      ____ 2. "How Times Change!"
      ____ 3. "Nuclear Too Dangerous? No, Says Poll!"
      ____ 4. "Nuclear Expansion Urged by Public"
      ____ 5. "Nuclear Benefits Outweigh Risks"
      ____ 6. My Choice: _____ _____

   c. Which of the following story leads will you chose?
      ____ 1. "From more than 2,000 interviews among top business executives, financiers, members of Congress, federal regulators and the public..."
      ____ 2. "While 57% of the American public favor a temporary ban on licensing new nuclear power plants, the public rejects the concept that nuclear power is too dangerous..."
      ____ 3. "Although 84% of the public agree that regulatory changes are necessary if the risks of

nuclear energy are to be acceptable, the public by an almost 2 to 1 margin believes that nuclear expansion..."

____ 4. "In a poll released today the public considers solar energy the most important energy alternative when compared with nuclear which..."

____ 5. My Choice: _____

d. You recently ran a series on energy conservation which suggested that the United States can prosper on much less energy than has been commonly supposed. It was well researched, you are confident that the data sources were accurate and that your reporters were fair in their analysis. The reporters are now working on an energy series that deals with risk. The first article will be published a week from today. You feel the poll is worthy of publication but you have some questions that you would like discussed. You schedule a meeting with your energy reporters.

This is what you decided: _____

_____

_____

And these are your reasons: _____

_____

_____

Tally the responses and discuss them with your class. What are some of the reasons for the choices and responses?

Did the fact that you agree or disagree with the majority of respondents affect your decisions in any way? If so, how? For example, if the majority agree with you, do you feel your position is more justified? Or, if they disagree, do you feel that you should reconsider your ideas?

3. Ask students to pick one alternative that they have learned about. If that alternative was to become an important contributor to solving the energy crisis, what positive and negative changes would it have on their neighborhood, city, state, nation and the world? How might it change their lives? Would they like to see those changes? Why or why not?

## RE/SOURCES

Levine, Jacob. 1956. Responses to Humor. Scientific American, February: 31-35.

The Gasoline Crisis: Star Special Report. 1979. The Minneapolis Star. Tuesday, April 24.

Trends: Special Package on Saving Energy. 1979. St. Paul Pioneer Press. Sunday, July 29.

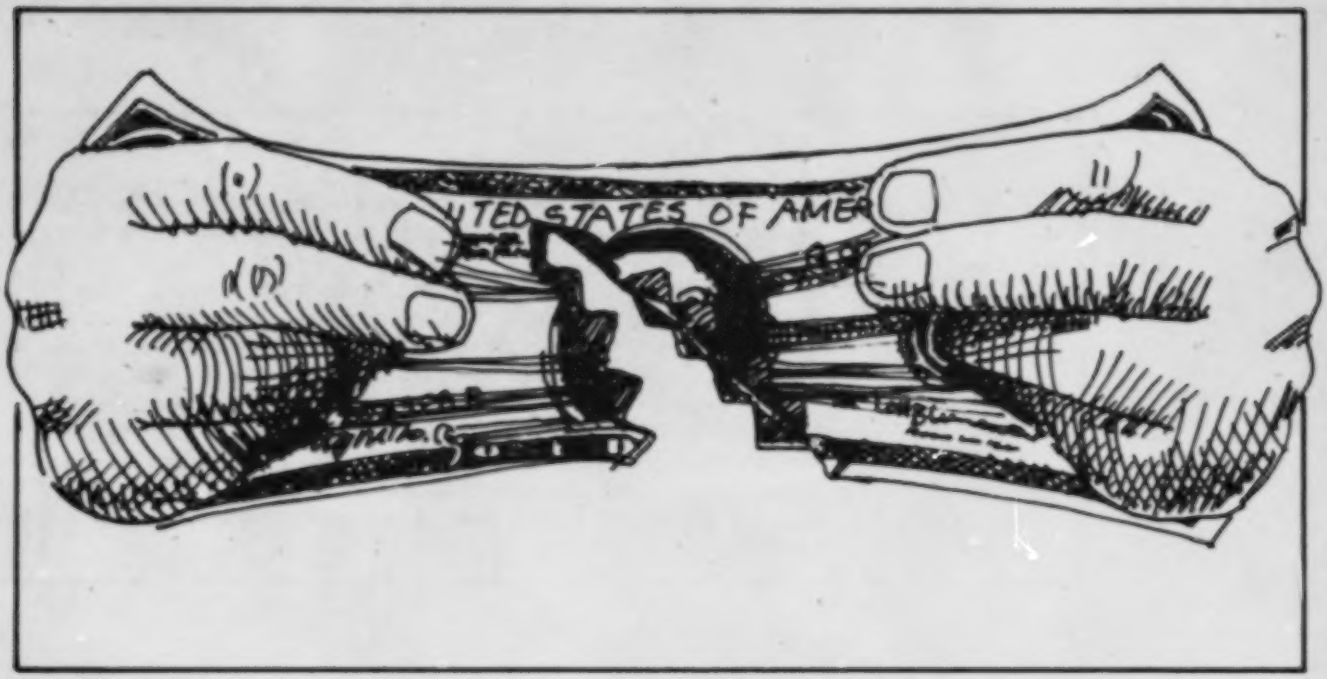
# IT'S A RIPOFF (ISN'T IT?)

## SUM/MARY

There are many people who regard our energy situation as a giant rip-off. In this activity students are presented with this question. They develop a tentative answer, test it and develop a conclusion. A structured process of hypothesis investigation is provided to help students do this.

# IT'S A RIP-OFF (ISN'T IT?)






## BACK/GROUND

The general public, at least one-third of it, seems to doubt the reality of the energy shortages we are experiencing. Cynicism, disbelief, skepticism, ignorance, and simple unconcern are widespread.

Politicians, including both the Legislative and the Executive Branches of government, are viewed as struggling to use the energy problem to enhance their own power and prestige, rather than acting to cope with the problem itself. Many believe that the oil companies and utilities are manipulating the energy crisis to enrich themselves.

People do not feel that information about energy is credible if it comes from either government or industry. Furthermore, many people who have been willing to make personal energy sacrifices are frustrated because, while their energy costs have increased, they are not sure that the burden of sacrifice is being or will be carried evenly by industry, the government and other consumers. There is also a suspicion among many people that others will profit economically and politically from their attempts to conserve.

# ACTIVITY

**Note**

**Teacher/ing**

This activity is about evidence and the problems of proof. How can we determine the accuracy and the truth of reports about the energy crisis?

After the identification of a problem about the energy crisis, students develop hypotheses they want to test, decide what evidence they need which will provide answers, develop plans of attack, test their hypotheses, and draw some conclusions based on their data.

A suggested sequence for organizing the study of the question posed to students is included below. The purpose for learning about an aspect of energy is stated in the form of a teacher-directed question which requires an answer. It is hoped that this purpose will sustain and guide the student-directed, teacher-assisted learning experience.

**ASK YOUR STUDENTS**

Is the energy crisis real or is it just a big plot to increase prices? Consider having students organize their study of this question as follows:

a. **The Development of a Tentative Solution.**

Have the students write a statement — a hypothesis — describing what they think about the reality of the energy crisis. To hypothesize is to guess or develop tentative answers about the conclusions which will be found. A hypothesis is the untested answer to a question. You can help students clarify their guesses by asking these kinds of questions:

1. What makes you say that?
2. How can we determine if you are correct?
3. David, do you agree with Alice?
4. What evidence convinces you that your hypothesis is true?

b. **Testing the Hypothesis.**

It is the hypothesis which will help students investigate the problem. To do this, students need to develop a well defined hypothesis. The suggested form is an "if...then" statement, for example:

**If** the energy crisis is real... **then** I expect to find...(specific evidence or examples). Note, especially, the particular form of the hypothesis (If...then). This kind of hypothesis is a way of directing the search for evidence. If the hypothesis is true, then evidence (at least certain kinds) exists which proves it. If the hypothesis is true, then evidence which is opposite to the supporting evidence will not exist.

**If** the energy crisis has been "manufactured" **then"**

- windfall profits of energy companies will increase,
- there will be evidence of energy-producing companies withholding energy supplies,
- there will be an emphasis on energy production rather than conservation,

...and so on.

Have students identify the kind of evidence they need to

find if their hypotheses about the energy crisis are really accurate. Evidence is any information that bears, in some way, on the hypothesis.

Have your students list some possible sources where such evidence might be found, e.g., magazines, newspapers, clipping files, books, reports, films, and speakers.

Now have the students review and collect some of the evidence they need to prove their hypothesis. "If...then..." statements also suggest the opposite kinds of evidence. Evidence that, if found, will falsify the hypothesis.

**If** the energy crisis is real, **then**:

- windfall profits of energy companies will not increase,
- there will not be evidence of energy-producing companies withholding energy supplies,
- there will not be an emphasis on energy production rather than conservation,

...and so on.

Students must look for both kinds of evidence. You are very important in this process. You can help by asking (until you are accurately accused of being repetitious!) questions such as

**If** the hypothesis is true, **then** what kind of evidence do you need?

**If** the hypothesis is false, **then** what kind of evidence do you need?

How do you account for your findings?

You are helping them to sharpen their focus on a key question: "What would you look for to prove (or disprove) your hypothesis?" This is a difficult skill and one that demands practice.

## A Little Note On Data Sources

This activity might be better if it included some useful data. Library research can be time-consuming and difficult. You may not have time to teach these skills to your kids. If your students have the library skills which will help them locate information, the frustration level will be greatly reduced. If you have assembled some data, or if you have films or a study on this issue, use them. Also, consider the possibility of using other social studies skills which your kids may already have: personal interviews, surveys, questionnaires, etc. If no data are directly available to you consider the possibility of having students read and skim written materials (especially the newspaper); listen to radio newscasts; watch the television news/a television special on energy during a particular time interval — one-, two- or three weeks. As students read and skim ask them to clip/circle/copy key words, phrases, quotes, data which prove /disprove their hypothesis. As they listen to the radio and watch television ask them to take notes which prove /disprove their hypothesis.

All of these possible approaches will provide you with an opportunity to discuss the advantages and disadvantages of particular social studies tools.

Emphasize the need to evaluate data. Is it authentic? Is it factually accurate? Who said it? What point of view might this person (authority) have? What are the implications of the data? Are the conclusions substantiated by evidence? What evaluative words are used in the arguments (Ask students to circle them or underline them in color.)? Is the evidence stacked?

Help students, as best as you can, to see what is in front of them, **not** what they are told is in front of them. Students will need to pause; to "stop and think"; and you have an opportunity to help them do that.

You can also have students write in their own words the content of some of the documents they read: "What does the evidence say?" Don't miss any opportunities for students to: classify information; make units of measurement consistent; arrange data by ranking it (which involves personal opinions), etc.

Once students have collected and arranged their data, they are now in a position to analyze it. It is a questioning activity.

- What are the trends?
- What patterns are evident?
- What is the relationship between the evidence and the hypothesis?
- How strong is the relationship between the evidence and the hypothesis?
- In what ways are the pieces of evidence related?

c. **Developing a Conclusion.** The energy crisis is...

Ask your students to develop a tentative conclusion based on the evidence they have seen so far. You may want to stop the lesson at this point.

Your students may regard the drawing of a conclusion as the final step. It may be. They may be able to resolve the problem or answer the question. But conclusions are often made on specific and/or limited evidence. There is usually a lingering question: "How do I know that the conclusion I have made is right?" You may simply want to mention and discuss this or apply the conclusion — confront it — with new information. This can result in expansion of the conclusion and may make it a more general finding. The value of generalizing from a larger set of supporting information is that it helps to predict as well as explain relationships between similar events and similar situations.

Generalizing requires the assembly, arrangement and analyses of new evidence as students attempt to determine the extent to which the original conclusion is substantiated or modified by new data. Earlier you asked students to list possible sources of relevant data. If any of these sources are available to you, use them. Does the conclusion stand in the light of new evidence? You are not asking students to consider their conclusion as invalid; quite the contrary! Their conclusions should be treated as valid. If their conclusion does not make sense with new and conflicting data, then it will require modifications.

## AFTER/WORDS

1. As you have thought about energy what important questions have been raised for you? Have they included questions of profits and payments? Based on your study who profits; who pays? Do you have any recommendations on ways that you would like to see the profit-pay system change?
2. Do you think we have more choices than many other countries? Why? Why not? What are they? What does this tell you about us as a nation?

## RE/SOURCES

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Sheils, Merrill and William J. Cook. 1979. New Cheer in Energy. Newsweek. September 24, p. 76.

Stobaugh, Robert and Daniel Yergin. 1979. Energy Future: Report of the Energy Project at the Harvard Business School. Random House, New York ($12.95).

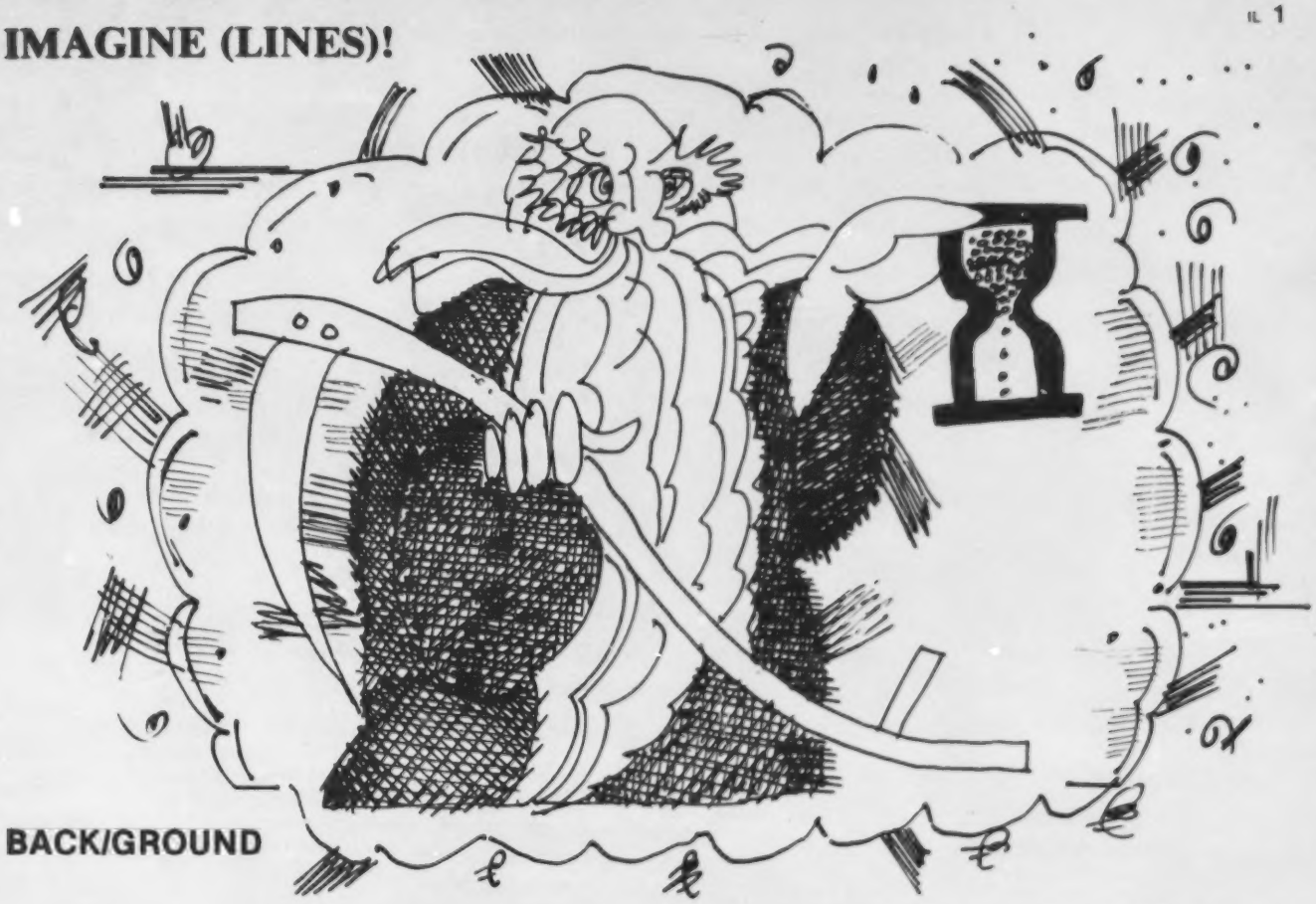
# IMAGINE (LINES)!

## SUM/MARY

Students develop an energy time line which denotes important past and future life events. They then develop an energy time line with their parents and/or an older person on important past and future life events. A short energy "doomsday" questionnaire is also included.

# IMAGINE (LINES)!

IL 1



## BACK/GROUND

Perspectives on time. We have quite a variety of them. What is their meaning? In what ways are they different from those of other generations? From those of different cultures? Consider the following planning units. (Perhaps you have never thought of them as "units" )

| UNIT | EVENT | IMPLICATIONS |
|---|---|---|
| Several 100's to 100's of 1000's of years | Decay of radioactive wastes. | Rights of future generations, animals, plants, etc. |
| 1,000,000 years | As in "once in a million years." The chances of the kind of accident which occurred at Three Mile Island as rated by some reputable experts. | Many accept such optimistic predictions and refuse to come to grips with the limits of personal/expert/ agency/government/industry knowledge. |
| 25,000 years | Reversal of the earth's geomagnetic field. | This regularly occurring event may weaken the ozone layer, wiping out some life; damaging others. |
| 60-70 years | Accumulation of $CO_2$ in the atmosphere. | Global climate affected. But how? Ice age or greenhouse? |
| | Development time for technologies to deal with accumulation of $CO_2$ in atmosphere. | If we pursue these new technologies now, the size and cost of the effort required would limit the options of withdrawing from it if other, unexpected, problems arise. |

| | | |
|---|---|---|
| 35 years | The doubling time of the population of the world, growing at a rate of about 2 percent a year. | 4 billion in 1975;<br>8 billion in 2010;<br>16 billion in 2045;<br>__ billion in _____. |
| 5 years | The 5 year plan of the company, school, business, etc.... | We're future oriented. We know where we are going and we can check on it. |
| 1 year | As in "wait until next year." Baseball, basketball team of your choice. | We're number one! (Next year, that is!) |
| 2 months | Living in Denver while on vacation from New York City. | Increase your chance of death by 1 in a million. |
| 45 days | The time alloted for public review and comment of many government reports. | Increases citizen participation in program planning and design. Widens perceptions of the public and the planners, designers and decision-makers. |
| 30 days | Weather bureau. | It is going to be wetter/drier and warmer/colder than usual. |
| 2 days | Living in New York City or Boston. | Increase chance of death by 1 in a million from air pollution. |
| 10 minutes | Ride a bicycle. | Increase chance of death by 1 in a million due to an accident. |
| 6 minutes | Travel in a canoe. | Increase chance of death by 1 in a million due to an accident. |

The ability to visualize the future, in detail or in general, does not appear to be a highly developed capacity, at least, in modern industrialized nations. This is dramatically emphasized by an observation of Professor Elise Boulding, a person whose work in the area of futuristics dates from 1961. She writes:

> Three little experiments I have conducted more or less annually for some years now convince me that we are seriously lacking in temporal estimation capacities, in American society, at least. I have asked college-educated parents of pre-school children what they anticipate will be happening in the world when their children are 21. The answer has not changed since 1950, when I first began asking: "We would rather not think about it. We hope things won't be >

worse than they are now." I have asked parents of undergraduate students in college what their retirement plans are. (Retirement for the average parent is 15 to 20 years away.) "We would rather not think about it." I have asked college undergraduates to project ahead to their own empty-nest and retirement years. "We'll be dead then." (They will be between 45 and 65 years old.)

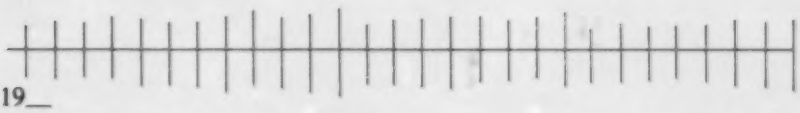
Reprinted with permission from
World Future Society BULLETIN,
September-October 1978,
"The Dynamics of Imaging Futures"
by Elise Boulding.

Do you agree with her? Is it important to be able to visualize or have a sense of any of the events listed above? Are some of them more important than others? Which ones?

# ACTIVITIES

## TIMING A LINE: I

Ask students to complete a time line of important events and dates during their lifetime, starting with their date of birth. The time line may be easier to visualize if it is on a large chart.




1. Students place the event above the line and the date below the line. There may be more than one event for the same date. End with the date they will be 75.
2. Include such events/dates as
   a. Birth
   b. School entry
   c. Grade now
      Graduation
   d. Three important energy-related things you have done
   e. Forecasts (Use those which apply to your plans. They must be energy-related. Invent categories which are missing from these examples.)
      1. Graduation from college/Vo-Tech/Other
      2. Transportation: kinds
      3. Technology: home, work, communications
      4. Travel: where
      5. World conditions: political, economic, social, environmental, energy
      6. Recreation: kinds, leisure time
      7. Three important things they would like to do which require energy.

**When students are finished:**

1. For each item or event, indicate whether it existed or will still exist at the following time intervals:
   - 100 years ago
   - 50 years ago
   - 10 years ago
   - 10 years from now
   - 50 years from now
   - 100 years from now.
2. Which items on the timeline
   - are purely local in their effects?
   - are purely national in their effects?
   - involve several nations or the entire world in their effects?
3. Explain why their world will become the way they predict it will.
4. What groups stand to gain and lose by the life events they predict?
5. Choose time intervals which represent, to them, the short, middle and long term future. Students are to identify their main assumptions and to indicate the reasons for these assumptions.

## TIMING A LINE: II

A. Ask students this question: "If your parents had been asked to complete this time line when they were your age, would they have listed the same kind of things?" Ask students to make some predictions on how their parents' list would have been different. When they have done this, ask students to do this time line with their parents. They are to use the same method but to add these events:

1) birth
2) school entry
3) important school events
4) marriage
5) first child
6) subsequent children
7) radio became a regular part of life
8) television became a regular part of life
9) 1st work experience (employment)
10) 1st job
11) subsequent jobs
12) 1st travel outside state of birth
13) 1st travel by airplane
14) 1st travel outside U.S.
15) 1st experience with computers
16) 1st use of credit cards/ buying on credit
17) 1st car purchase
18) subsequent cars
19) 1st home purchase
20) subsequent home purchases
21) 1st freeway travel
22) three most important energy events
23) use three of forecasts that you answered.

B. Students can also do this time line with older members of their family or with older members of their community. Again, have them use the event and forecast system they used with their parents.

## AFTER/WORDS

Use these questions to discuss the time lines.

1. Will it be possible for you to have everything you want? If so, what might possibly prevent you from having what you want? If not, what would stand in your way?
2. What are some of the implications of your predictions for the future? More, less, or about the same risks as now? What risks will change and in what direction? (Increase, decrease.) What problems are the most serious? What ones, if any, do you think are not solvable? What are some reasons?
3. What have been some of the effects of technology on the earth and its people? In what ways have events been modified? What are some reasons for these changes? Have the effects been good or bad?
4. Will they have more, less, or about the same possessions as people do now? What are some reasons for their choices?
5. What are some ways that student and parent lists differ? What can be inferred about beliefs, values and life-styles from these time lines?
6. What are some of the worst problems facing our world? What energy events on their time line would be different if some of these were solved?
7. In 1976, Walter Westman, a professor of geography at the University of California, conducted an informal poll of doomsday expectations. The poll is not specifically about energy but words in the question such as "developed" and the phrase "vastly diminished" have energy connotations. You may want to change it slightly. You and your students may also not want to be as doomsday oriented! You could, for example, include the word energy between developed and state or simply re-write the question.

   Professor Westman asked students and faculty to respond, by secret ballot, to the following question: "How long do you think our civilization will continue to exist in the developed state before it is vastly diminished or destroyed?" The responses he reported are found in the table below.

| Category | Class | # | Year | Prediction |
|---|---|---|---|---|
| Graduate students | Environmental Planning | 12 | 1975 | 100 years |
| Graduate students | Environmental Planning | 16 | 1976 | 150 years |
| Graduate students | Planning | 35 | 1976 | 200 years |
| Graduate students | Architecture | 16 | 1976 | 100 years |
| Undergraduate students | Environmental Biology | 94 | 1976 | 25 years |
| Faculty | Planning | 8 | 1976 | 700 years |
| Faculty | Agriculture | 4 | 1976 | 500 years |

Westman noted several interesting features:

(1) Those who teach have a different horizon than those who learn.

(2) The number of "forever" answers was very few (3 out of 122).

Try this poll with your class. The faculty. Parents. Community. Westman invited readers of **Science** to send him results, indicating approximate ages, occupations, and sizes of groups. If you use it and plan to share the results with him you will want people to include their age and occupation on the ballot. The results are to be sent to this address:

Walter E. Westman
Department of Geography
University of California
Los Angeles, CA 90024

- What differences do students find among the groups surveyed? What do students think they mean?
- Are student predictions predominately grim?
- What are some reasons that different age groups may have different predictions? Develop a hypothesis which is capable of being tested and test it.
- How "good" is the information collected?
- What would cause students to change their prediction?

## RE/SOURCES

Boulding, Elise. 1978. The Dynamics of Imaging Futures. World Future Society Bulletin, September-October:1-8.

League of Women Voters Education Fund. 1977. Energy Options: Examining Sources and Defining Government's Role. League of Women Voters of the United States, 1730 M Street N.W., Washington, DC 20036. (Single copy $1.00).

Tucker, Carll. 1979. The Back Door: Accident-Prone. Saturday Review. May 26, page 76.

Westman, Walter E. 1976. Doomsday Expectations. Science 193 (August 26): 720.

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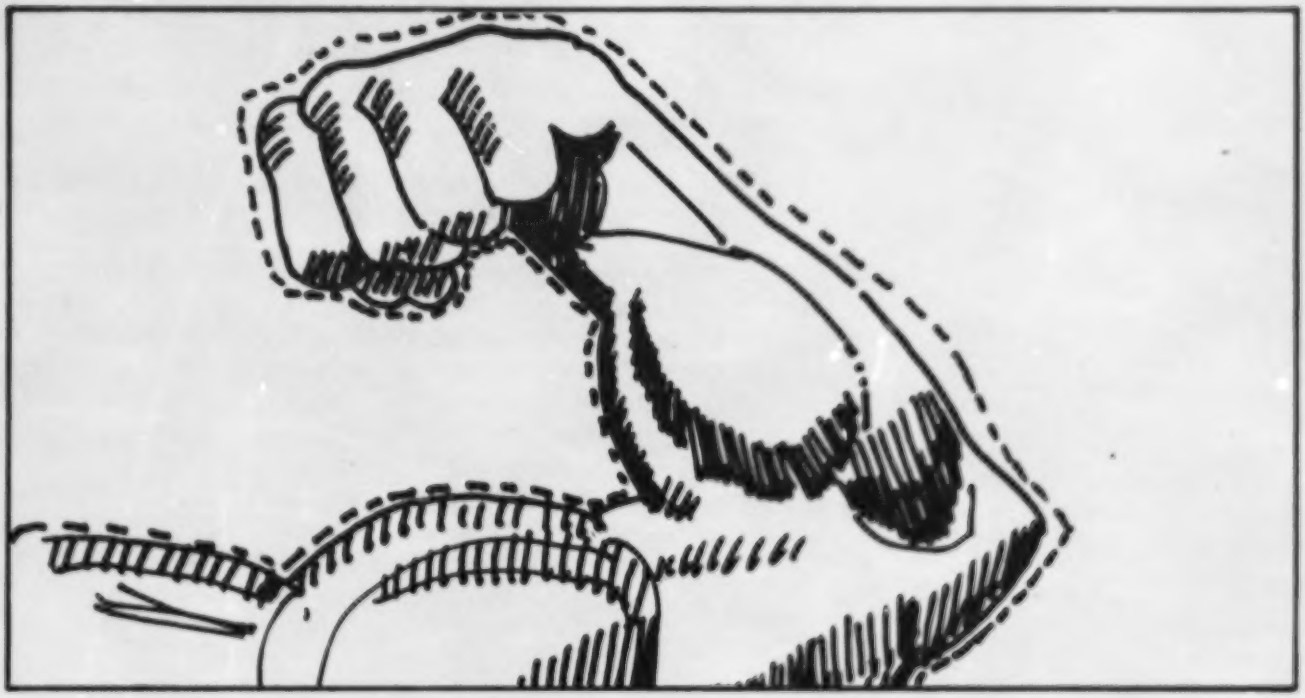
# (UN)GENTLE PERSUASION

## SUM/MARY

Students evaluate four alternative proposals to reduce gasoline consumption in their community. Students consider the costs and benefits involved in economic decision making and learn that every economic transaction involves trade-offs — something is gained and something is lost. Students then develop a plan of their own.

# (UN)GENTLE PERSUASION



## BACK/GROUND

The transportation sector accounted for 28 percent of total energy consumed in Minnesota in 1975. Transportation use of energy is broken down as follows: automobiles, 59 percent; trucks, 27 percent; aircraft, 7 percent; rail, 4 percent; and other uses, 3 percent.

Over 95 percent of the fuel used in the transportation sector is petroleum based. In fact, over one-half of all petroleum used in the state is consumed in the transportation sector.

Fifteen percent of the fuel consumed by automobiles could be saved if people adopted better car maintenance, car use, driving techniques and better trip planning. A minor tune-up alone can sometimes produce a 10 percent improvement in mileage. Drivers' training that stresses fuel efficient driving techniques has shown initial savings of 15 percent.

Increased vehicle occupancy through carpools and vanpools as well as buses could significantly reduce congestion, automobile emissions and energy use. The potential savings from ride sharing and mass transit are great but these programs depend largely on the level of public knowledge and acceptance. The most effective way to improve bus efficiency is to increase occupancy. The level of energy savings will depend on the rate at which people can be persuaded to change their habits.

Because school buses and public transportation already provide most students a convenient way to get to and from school, many people feel that there is no need for students to drive their own cars. It is almost certain that the gasoline situation will grow worse and in a recent editorial the writer suggested another energy option.

Most school districts around the state are confronting an extremely serious problem with soaring prices and rapidly diminishing supplies of fuel for their school buses. But while school administrators and transportation officials are discussing a wide range of conser-

vation options, they so far have avoided alternatives that would force students to walk any farther than they already do.

St. Paul Pioneer Press
**Shoe Leather as an Alternative**
**August 21, 1979**

Proposals to discourage and limit driving are being discussed throughout the country. Among the proposals for reducing the demand for gasoline are the following:

1. Let the prices soar to the point where driving for nonessential reasons will be eliminated — except, of course, for the affluent.
2. Reduce the weight and horsepower of automobiles.
3. Provide an efficient mass transit system.
4. Remove smog or anti-pollution devices from automobiles, which increase fuel consumption by about 30 percent.
5. Federally-imposed gasoline rationing.
6. A one-day-a-week driving ban under which drivers are allowed to drive only six days per week.

# ACTIVITIES

## THERE MUST BE A PLAN!

Four proposals to help reduce energy consumption are suggested in this activity. They can be considered as school and/or community proposals designed to show a commitment to energy conservation and leadership in energy conservation measures.

1. Divide the class into small groups (4-6).
2. Each group examines the plans and chooses the one that makes the most sense to them or develops a counter-proposal. Each group should make tables which list: (1) the positive and negative consequences of their decision; (2) those persons and groups who stand to gain and lose from their decision; and (3) barriers to implementing the proposal and actions to be taken to deal with these barriers.
3. Have each group appoint someone to explain the group decision to the rest of the class.
4. Which plan had most support? Least support? What are some of the reasons?

## THE PROPOSALS

A. Should it be the job of the public school system to teach teenagers how to drive? Despite all the problems associated with our dependence on the private automobile — air pollution, the weakening of the dollar because of our dependence on foreign oil, and the continuing transformation of our cities into parking lots — we continue to enable every student to learn to drive at age 16. Is that our job?

Driving is not a healthy thing to do. It is the leading cause of death among teenagers. It is also a costly thing to do — costly to the environment and costly to individuals. Most of us know young people who spend a good deal of their life working to feed and maintain a car.

Maybe the school system would be doing its students and the environment a favor by teaching how to get along without a car.

B. All school parking lots are closed to students who drive. Teachers and school staff would still be allowed to park on school property. Cars violating this plan would be towed away at the owner's expense.

C. School parking lots can be used by students at the rate of $3.50 per day. The administration and school reserves the right to raise that rate if there is no reduction in student use of the parking lots to the point where it is too expensive for most students to park on school grounds.

D. Parking permits will be distributed to students who need to drive to school. The total number of permits will be limited to 1/4 of the present spaces available. The priorities, in order of preference, are listed below:
   1) Medical reasons
   2) Enrollment in school programs which require transportation
   3) Work
   4) Carpools of at least 4 students
   5) Seniors
   6) Other

## AFTER/WORDS

1. Which proposal is most threatening to individual freedom? Least threatening?
2. Which proposal offers the most energy savings? What makes you say that? How could you prove it?
3. Are any of the proposals fair? What is right and wrong about them? What is just and unjust about them? What additional information would you like to have had to help you reach a decision?
4. In January, 1980, the Minnesota State Department of Education said that students should be discouraged from driving to school. In response to a question one official explained:

   "During a period of expanding school enrollments and economical oil and gasoline, many schools provided parking space for automobiles driven by student."

   "The time has come to reconsider whether schools should encourage students to drive to school, especially when school bus transportation is provided. Education should set an example, not just teach about conservation of natural resources. If students want the privilege of driving, they should be taught to accept the responsibilities of driving, and one of those is the conservation of resources used by driving a car."

   "We urge schools to allow students to park in school-controlled areas by permit only. We realize that some students are enrolled in programs which require transportation to a job and other students must drive to work after school. Others need occasional transportation for medical appointments, for example. But these are exceptions."

   "Some school districts have open-campus lunch periods. We suggest closed lunch periods of 30 minutes which will tend to cut down noontime driving."

   "Efforts by school administrators to limit student driving would not be popular, but we think this type of leadership is going to be needed. We believe students will recognize the need to conserve resources and will cooperate."

   "Schools must accept responsibility for conservation education, and their actions must reflect their teachings.

   **Update**, January 1980

   According to the official, what is the problem?
   What evidence is provided in support of the main idea?
   Do you agree with the conclusion? Why/Why not?

Does the official suggest that the automobile provides us with a distinctive approach to life? What are some of the characteristics of an automobile approach to life?

What assumptions, if any, does the author make?

Why do you think the Minnesota Department of Education has taken such a position?

If you were this official, what is one thing you would have said to make the proposal more attractive?

What question would you like to ask the official?

4. Do you think that one segment of the population, e.g., teenagers, is being asked to bear responsibility for energy conservation? Why or why not?

## RE/SOURCES

Flynn, John. 1979. Opinion. The Community Studies Newsletter. Special Education. January (Special Education Service Center, Minneapolis Public Schools).

Minnesota State Department of Education. 1980. Schools Should Set Example in Energy Savings By Reducing Student Driving. Update. Vol. 14, No. 5 (January):1.

Shoe Leather as an Alternative. 1979. Editorial. St. Paul Pioneer Press. August 21.

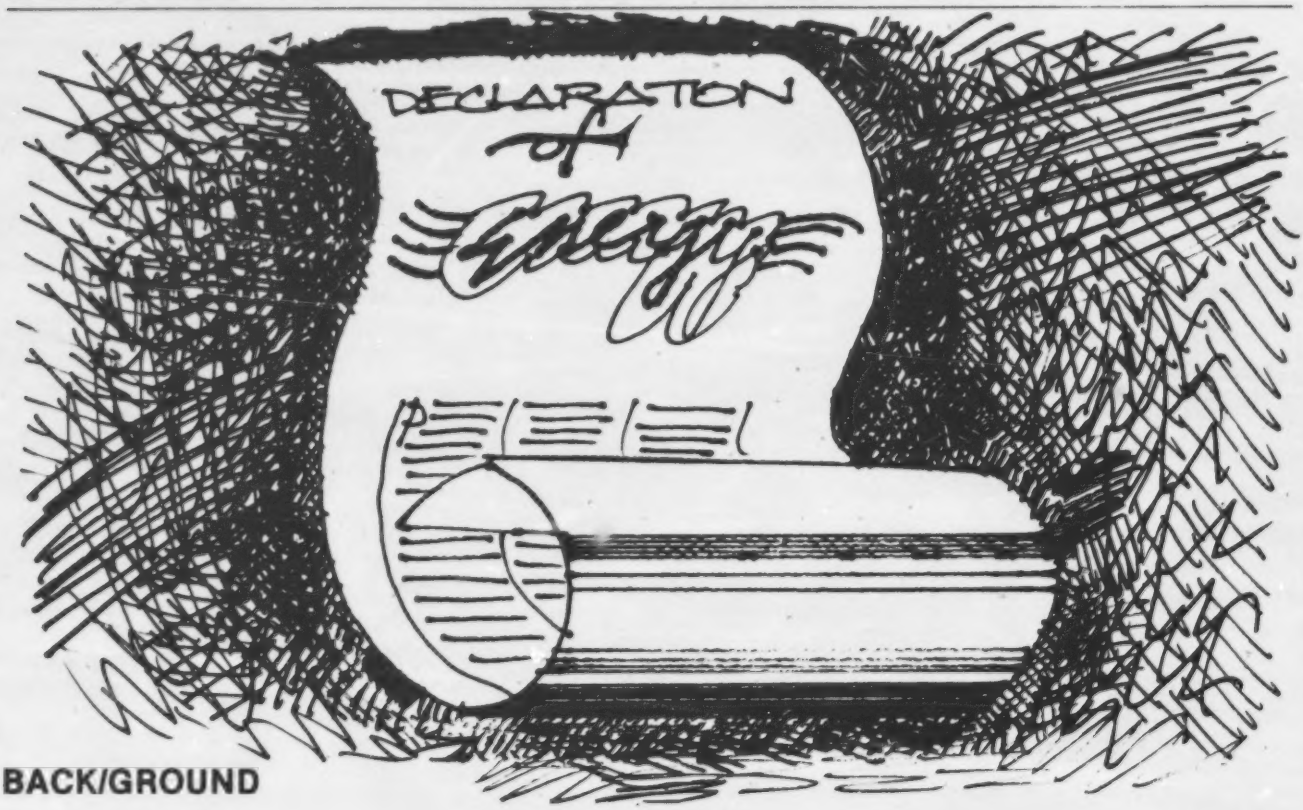
The Minnesota Challenge. A driving efficiency program which seeks to reduce fuel consumption by explaining driving techniques that are proven fuel savers. It includes the film **Featherfoot**, a quiz to determine your Driving Efficiency Quotient (DEQ), student brochures, personal mpg records, and mpg calculators. It is available from your local Education Cooperative Service Unit (ECSU).

# DECLARATION OF ENERGY INTERDEPENDENCE?!

## SUM/MARY

In this activity students explore the meaning of energy dependence, independence and interdependence. They write a Declaration of Energy Interdependence.

# A DECLARATION OF ENERGY INTERDEPENDENCE?!




## BACK/GROUND

More than two centuries ago, people involved in the founding of this country wrote the Declaration of Independence. It is a document of more than historical significance because it illuminates the landscape of our society.

It is who we are. It is what we do. It is what we are trying to become. It is a sacred, remarkable document which we use for steerage. Its insistence on accountability is just one of its remarkable strengths. The Declaration of Independence is a fundamental assertion of individual human rights.

The words "independence," "interdependence" and "dependence" are increasingly used in a variety of energy-related contexts. In his energy message of November 7, 1973, President Nixon asked for a commitment to a new national endeavor called Project Independence. Its goal? "...(By) the end of this decade, we will have developed the potential to meet our own energy needs without dependence on any foreign...energy source." The concept of energy independence involves a primary reliance on domestic energy resources, uninterrupted access to reasonably priced energy supplies, and the maintenance of national security.

The goal of energy independence seemed incredibly clear and in some ways easy when it was first articulated. However, since 1973 America has grown even more dependent on imported oil. This has led to an erosion of the value of the dollar, a crippled domestic economy and increased unemployment.

> Last year, this country used energy at a rate equivalent to 37 million barrels of oil a day. Almost **half** of that energy came from oil itself. And almost half of that oil, **a quarter of our total energy consumption**, was imported. Each and every hour, the United States imports an average of almost 400,000 barrels

of oil, an unsustainable rate.

So we have no alternative; we **must** reduce dependence on the oil we're importing, and we must use the oil we consume more efficiently.

U.S. Department of Energy, 1979
**A New Start: The National Energy Act**

How are we to achieve this independence? At the national level the policy goals are clear: much larger scale energy development and more intensive use of our own non-renewable energy resources.

There are also voices pleading that we think hard about energy interdependence. Elliott Richardson captured this very simply in his 1979 Interdependence lecture in Philadelphia: "Once you see that the kneebone is connected to the thigh bone and the thigh bone is connected to the hip bone, you can no longer pretend that they are separate." In many ways, the Organization of Petroleum Exporting Countries (OPEC), may be thought of as one of our teachers about the interdependence of the 1970's. In a recent book, economist Hazel Henderson (1978) presents some arguments for a Declaration of Interdependence.

Just what do the terms dependence, independence and interdependence have to do with the energy situation, the future of industrial societies, greater global equity and sharing of the energy-and-materials resource pie? Some would argue that the concepts bear heavily on the emerging debate over centralized political control and planning and decentralized political control and planning. This debate is a much larger one than energy technology. Today's energy problems are also, at the very least, environmental, social, political and economic. However, anthropologists Dr. Luther Gerlach and Betty Radcliffe, highlight some of the dilemmas of the debate:

> A splendid case can be made for the need to manage resources and society more systemically and interdependently and to integrate decision making on ever larger scale. It is said to be the way to deal with the great and complex environmental, economic, and resource problems of the day, since these transcend local boundaries, specific points in time, and the interests of specific individuals and communities. It is also said to be the way to incorporate the latest approaches in holistic thinking and in recognizing that individual or local decisions, which are useful and rational in themselves, now often add up to maladaptive consequences at the macro or large-scale level. Thus, pressures to manage the United States and other western societies each as integrated wholes, and even to integrate the decision making of all of these societies ever more tightly are growing. This can be called the integrative dynamic. A key slogan legitimating this dynamic is interdependence.
>
> An equally splendid case can be made for the need to recognize, accept and even encourage growing individualism, self-actualization, self-fulfillment, and local control and diversity. Recognizing the importance of the individual, local communities, and diversity and pluralism not only is supposed to protect cherished freedoms and human rights, but also to prevent remote government and technocratic specialists from locking people into big mistakes. It is said that not only social, but

also ecological stability can best be achieved by moving away from centralization in resource development and societal management. Decentralization, local control and independence are slogans legitimating this counter integrative dynamic.

Reprinted with permission from **Futurics** 3
Gerlach, Luther P. and Betty Radcliffe.
"Can Independence Survive Interdependence?"
1979. Pergamon Press, Ltd.

## ACTIVITY

A. Discuss dependence, independence and interdependence with your class, especially within the context of energy. Develop a definition for each which you and the class agree upon. You may want to try a dual approach: a general definition of each and a definition with an energy meaning.

| CONCEPT | GENERAL MEANING | ENERGY MEANING |
|---|---|---|
| 1. Interdependence | | |
| 2. Independence | | |
| 3. Dependence | | |

Ask students to rank order them from most desirable to least desirable. What are some of their reasons?

Now have students focus on the energy implications of each concept. Ask them to develop a list of goods and noods (not goods) for each.

| | DEPENDENCE | | INDEPENDENCE | | INTERDEPENDENCE | |
|---|---|---|---|---|---|---|
| LEVEL | GOODS | NOODS | GOODS | NOODS | GOODS | NOODS |
| Personal | | | | | | |
| Family | | | | | | |
| Community | | | | | | |
| State | | | | | | |
| Nation | | | | | | |
| International (World) | | | | | | |

With respect to energy, which one is the best policy? On a personal level? Family? Community? State? Nation? World? How come? Who agrees? Who disagrees? Why?

B. Of what use is a "Declaration of Energy Interdependence"? Have your students first respond to the following "Declaration of Interdependence" from the World Affairs Council of Philadelphia, October 24, 1975, by circling SA (Strongly Agree), A (Agree), NO (No Opinion), D (Disagree) or SD (Strongly Disagree). Have students underline the words/phrases they like and cross out words/phrases they do not like.

When they are finished tell them that this document was endorsed by the State of Minnesota on Law Day, May 1, 1976.

The list was signed by the following State Officials and endorsed by the following community leaders.

## THE MINNESOTA ENDORSEMENT

### State Officials

| | |
|---|---|
| Wendell R. Anderson | Governor, State of Minnesota |
| Nicholas D. Coleman | Senate Majority Leader |
| Rudy Perpich | Lt. Governor |
| Irv Anderson | House Majority Leader |
| Robert Ashbach | Senate Minority Leader |
| Martin O. Sabo | Speaker of the House |
| Henry J. Savelkoul | House Minority Leader |
| Jim Lord | State Treasurer |
| Joan Growe | Secretary of State |
| Robert Mattson | State Auditor |
| Warren Spannaus | Attorney General |

Other Signers

| | |
|---|---|
| Don Fraser | Member of Congress |
| Hubert H. Humphrey | U.S. Senator |
| Walter F. Mondale | U.S. Senator |
| Charles H. Slocum | Chairman, Independent-Republicans of Minn. |
| David Roe | President, Minn. AFL-CIO |
| Rick Scott | Chairman, Minn. DFL Party |
| Earl D. Craig, Jr. | President, Mpls. Urban Coalition |
| Robert J. Shoran | Chief Justice, Minn. Supreme Court |
| A.C. Lehman, Jr. | Exec. Director, Minn. Council of Churches |
| George C. Mastor | President, Minn. State Bar Assn. |
| Jerry Jenkins | President, League of Women Voters |
| C. Peter Magrath | President, University of Minnesota |
| T.M. Richter | President, World Federalists Assoc. |
| John R. Roach | Archbishop of Minneapolis & St. Paul |
| John Edie | President, UNA of Minn. |

## A DECLARATION OF INTERDEPENDENCE

WHEN in the course of history the threat of extinction confronts mankind, it is necessary for the people of The United States to declare their interdependence with the people of all nations and to embrace those principles and build those Institutions which will enable mankind to survive and civilization to flourish. SA A NO D SD

Two centuries ago our forefathers brought forth a new nation; now we must join with others to bring forth a new world order. On this historic occasion it is proper that the American people should reaffirm those principles on which the United States of America was founded, acknowledge the new crises which confront them, accept the new obligations which history imposes upon them, and set forth the causes which impel them to affirm before all peoples their commitment to a Declaration of Interdependence. SA A NO D SD

We hold these truths to be self-evident: that all men are created equal; that the inequalities and injustices which afflict so much of the human race are the product of history and society, not of God or nature; that people everywhere are entitled to the blessings of life and liberty, peace and security and the realization of their full potential; that they have an inescapable moral obligation to preserve those rights for posterity; and that to achieve these ends all the peoples and nations of the globe should acknowledge their interdependence and join together to dedicate their minds and their hearts to the solution of those problems which threaten their survival. SA A NO D SD

To establish a new world order of compassion, peace, justice and security, it is essential that mankind free itself from the limitations of national prejudice, and acknowledge that the forces that unite it are incomparably deeper than those that divide it — that all people are part of one global community, dependent on one body of resources, bound together by the ties of a common humanity and associated in a common adventure on the planet Earth. SA A NO D SD

Let us then join together to vindicate and realize this great truth that mankind is one, and as one will nobly save or irreparably lose the heritage of thousands of years of civilization. And let us set forth the principles which should animate and inspire us if our civilization is to survive. SA A NO D SD

WE AFFIRM that the resources of the globe are finite, not infinite, that they are the heritage of no one nation or generation, but of all peoples, nations and of posterity, and that our deepest obligation is to transmit to that posterity a planet richer in material bounty, in beauty and in delight than we found it. Narrow notions of national sovereignty must not be permitted to curtail that obligation. SA A NO D SD

WE AFFIRM that the exploitation of the poor by the rich, and the weak by the strong violates our common humanity and denies to large segments of society the blessings of life, liberty and happiness. We recognize a moral obligation to strive for a more prudent and more equitable sharing of the resources of the earth in order to ameliorate poverty, hunger and disease. SA A NO D SD

WE AFFIRM that the resources of nature are sufficient to nourish and sustain all the present inhabitants of the globe and that there is an obligation on every society to distribute those resources equitably, along with a corollary obligation upon every society to assure that its population does not place upon Nature a burden heavier than it can bear. SA A NO D SD

WE AFFIRM our responsibility to help create conditions which will make for peace and security and to build more effective machinery for keeping peace among nations. Because the insensate accumulation of nuclear, chemical and biological weapons threatens the survival of Mankind we call for the immediate reduction and eventual elimination of these weapons under international supervision. We deplore the reliance on force to settle disputes between nation states and between rival groups within such states. SA A NO D SD

WE AFFIRM that the oceans are the common property of mankind whose dependence on their incomparable resources of nourishment and strength will, in the next century, become crucial for human survival, and that their exploitation should be so regulated as to serve the interests of the entire globe, and of future generations. SA A NO D SD

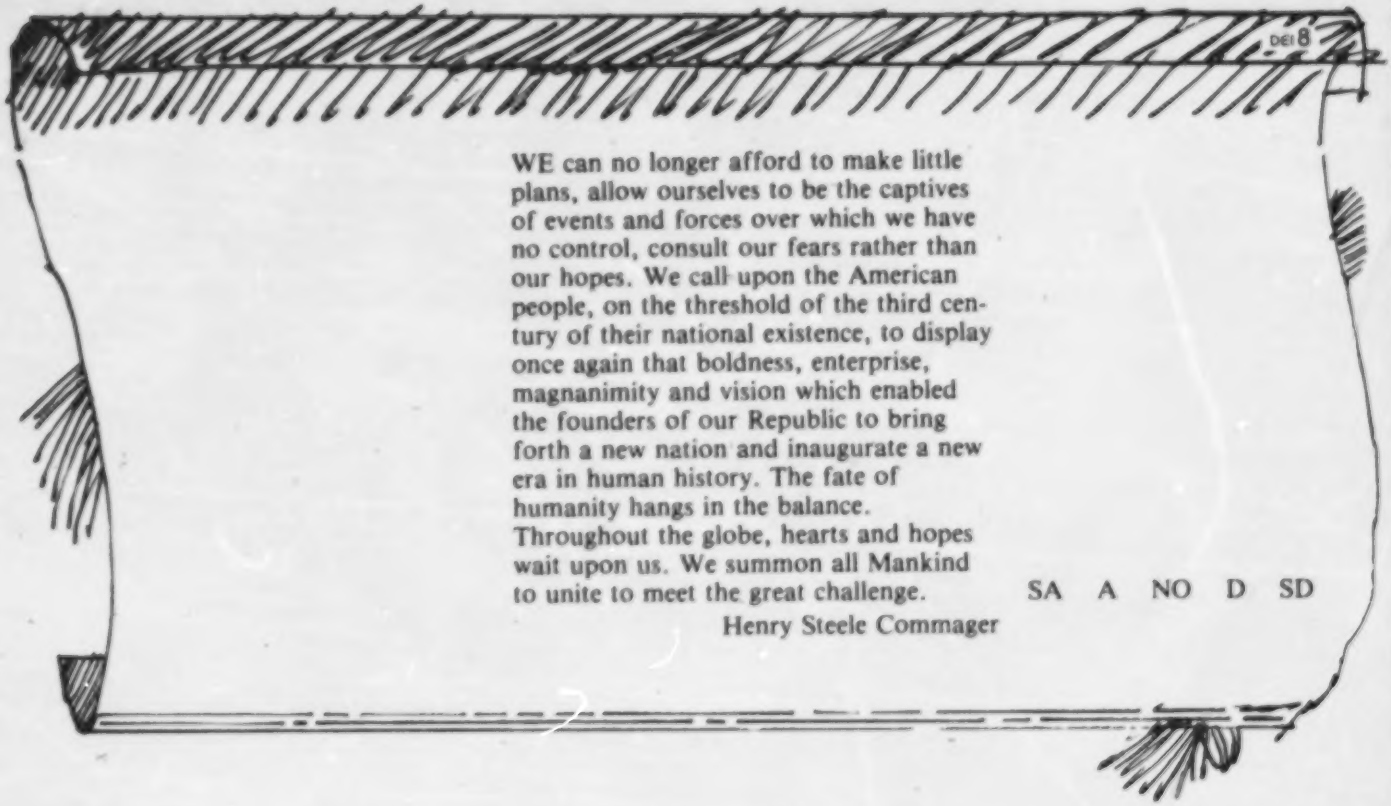
WE AFFIRM that pollution flows with the waters and flies with the winds, that it recognizes no boundary lines and penetrates all defenses, that it works irreparable damage alike to Nature and to Mankind — threatening with extinction the life of the seas, the flora and fauna of the earth, the health of the people in cities and the countryside alike — and that it can be adequately controlled only through international cooperation. SA A NO D SD

WE AFFIRM that the exploration and utilization of outer space is a matter equally important to all the nations of the globe and that no nation can be permitted to exploit or develop the potentialities of the planetary system exclusively for its own benefit. SA A NO D SD

WE AFFIRM that the economy of all nations is a seamless web, and that no one nation can any longer effectively maintain its processes of production and monetary systems without recognizing the necessity for collaborative regulation by international authorities. SA A NO D SD

WE AFFIRM that in a civilized society, the institutions of science and the arts are never at war and call upon all nations to exempt these institutions from the claims of chauvinistic nationalism and to foster that great community of learning and creativity whose benign function is to advance civilization and the health and happiness of mankind. SA A NO D SD

WE AFFIRM that a world without law is a world without order, and we call upon all nations to strengthen and to sustain the United Nations and its specialized agencies, and other institutions of world order, and to broaden the jurisdiction of the World Court, that these may preside over a reign of law that will not only end wars but end as well that mindless violence which terrorizes our society even in times of peace. SA A NO D SD



WE can no longer afford to make little plans, allow ourselves to be the captives of events and forces over which we have no control, consult our fears rather than our hopes. We call upon the American people, on the threshold of the third century of their national existence, to display once again that boldness, enterprise, magnanimity and vision which enabled the founders of our Republic to bring forth a new nation and inaugurate a new era in human history. The fate of humanity hangs in the balance. Throughout the globe, hearts and hopes wait upon us. We summon all Mankind to unite to meet the great challenge.

Henry Steele Commager

SA A NO D SD

When students have finished, tally and review the responses. Are there any trends? What might be some reasons? Does the class generally agree or disagree with the statement?

After the class has reviewed the document and discussed the responses, ask students whether their community, state, nation or world should have a "Declaration of Energy Interdependence"? Divide the class into small interest groups (community, state, nation, world) and have each group write a statement and develop a list of people who should sign it.

When students are finished, ask representatives from groups to read them. Some questions for discussion include:

- Does the level of organization (community, state, nation, world) influence how specific or general the statements can be?
- In what ways are statements from each group alike or unlike?
- Do students think such statements would be useful or not useful in meeting the energy situation?
- What do we have to assume if we agree that such statements are useful? Not useful?
- Would you like to let someone else read your statement? Why or why not?
- Who might not sign your Declaration? What does this say to you about it? Would it still be effective without the signature?
- Who stands to profit and lose from your Declaration?

## AFTER/WORDS

1. Do you think a Declaration of Energy Interdependence would increase or decrease potential conflicts over energy? Why or why not? How would such a document influence our present dependence on imported oil? Would we use less, more, or about the same amount of oil that we do now?
2. Are we addicted to "progress"? In what ways would a **Declaration of Energy Interdependence** influence progress?
3. Do we have to help people "kick the energy habit"? If we do, what is the "habit"? In what ways would a **Declaration of Energy Interdependence** help?

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# AD/VANTAGES — DISAD/VANTAGES

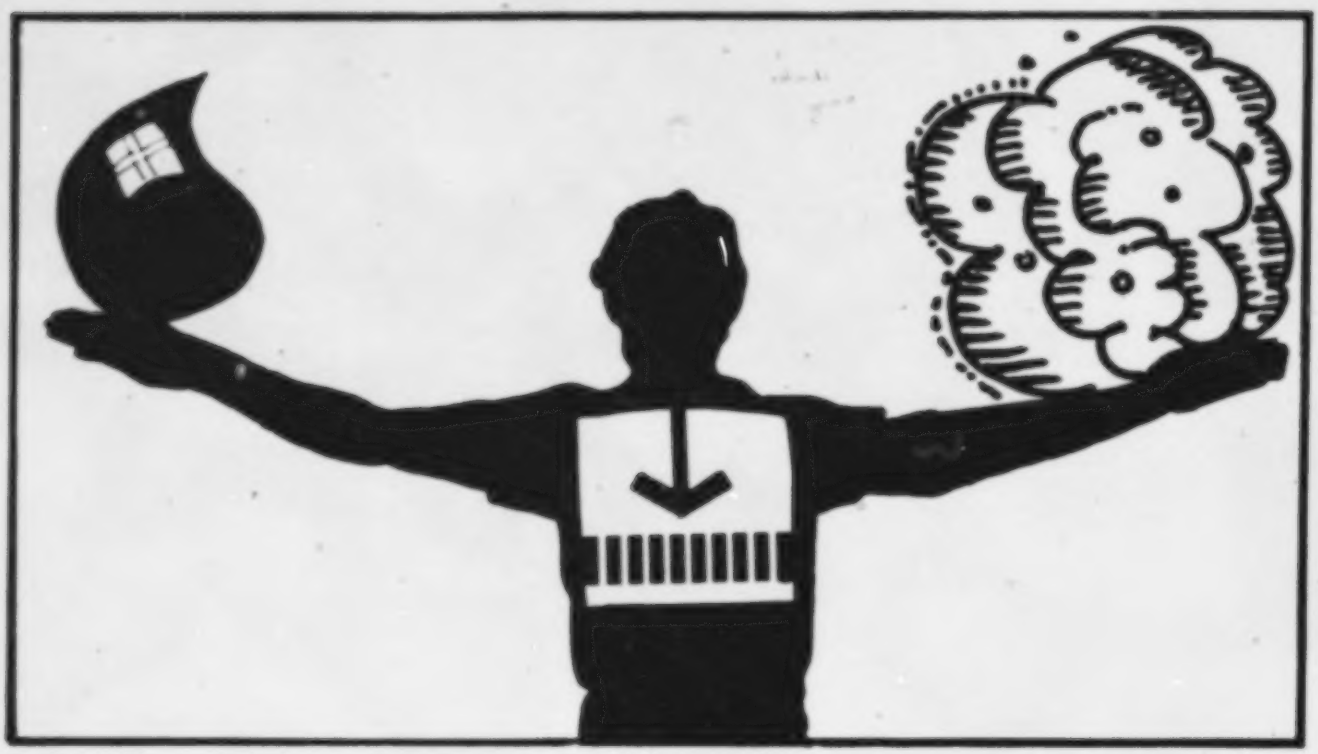
## SUM/MARY

In this activity students focus on six interrelated and important energy options: nuclear, coal, petroleum, natural gas, energy conservation and solar.

Students research the problems and potentials of some possible alternative energy sources. Summarizing discussion questions follow the activity. The activity also includes an assessment tool to help students compare alternatives and a student energy conservation contract.

# AD/VANTAGES — DISAD/VANTAGES





## BACK/GROUND

At the end of 1973, the United States, as well as the other oil importing countries, received a momentous economic shock when the Organization of Petroleum Exporting Countries (OPEC) announced that they, and not the oil companies, were going to set petroleum prices. Until then we had always regarded almost all forms of energy, and especially petroleum energy, as cheap, readily available and the supplies secure. The OPEC action made us aware that we are vulnerable to the possibility of supply interruptions at any time **and** to a future characterized by continuing higher oil prices.

These twin vulnerabilities require an energy policy that reduces our heavy dependence on imported oil. The issues associated with such an energy policy are complex, ridden with strife, and involve uncertainties about environmental effects, technologies, the statements of experts, the effects of a policy point on the economy and the society. It is still clear that we must act promptly and creatively to expand our energy options. This includes knowing about energy sources and their respective potentials.

# ACTIVITY

This is essentially a student research activity which may take from several days to two or three weeks. The activity contains a sample data recording sheet. Most students will find that the space provided is much too small. Some students may want a full page per category. If you like it, ask your students to transfer the sheet to their notebooks.

At the end of the activity you will find a **selected** list of reference material. Many of the references are from publications available in school resource centers. The references are heavily biased toward science magazines. Some of the articles from these sources are difficult and technical while others, especially the shorter ones (1-4 pages), are more like newspaper articles. You may find them useful.

There is so much published about energy that any bibliography is almost instantaneously dated. Magazines such as Audubon, Sierra, Time, Newsweek, Business Week, U.S. News and World Report, Science News, Saturday Review, The Atlantic, Harper's, and even Sports Illustrated (July 30, 1979, synfuels) will probably be helpful. Most of these magazines have a position about various energy alternatives although it may not always be obvious. You and your students need to be aware of this.

Divide your class into groups of 3-5 and assign each group one of the following energy alternatives (change or substitute to fit your needs): nuclear, coal, petroleum, natural gas, energy conservation and solar.

The class is going to act as a United States Energy Policy Commission. Each energy study group represents a sub-committee of the whole assigned to collect some information upon which to determine energy policy.

Students are to read books, newspaper articles, magazines (a wide variety), listen to the radio, watch television, and talk with local experts to gather information on the advantages and disadvantages of their energy alternative for six categories: environment, political, economic, attitudes, social, health and safety.

The six categories are not exhaustive and you and the class may want to add, modify or delete categories. The categories are not necessarily mutually exclusive. Positive, or pro, and negative, or con, factors are to be considered for each of the six categories. Encourage examination of at least two pro and two con factors. The categories may be characterized as follows:

Environment: Impacts on the environment. How do nature and the alternative get along? What are the short- and long-term environmental effects? What is known? Of what are we less sure?

Political: What laws or policies exist which affect the alternative? What laws would need to be changed? What new laws are proposed? What are the effects of some of these laws?

Economics: How much does the alternative cost? Who pays? Is it "subsidized" (Government research money, tax benefits)? Will it create or cost jobs?

Attitudes: How do people feel about the alternative? What are the prevailing opinions? Who is for it? Against it? What are some of their reasons? How do opinions vary between interest groups, e.g., business and environmentalists?

Social: What are some possible effects on our social structure? Who stands to lose? Gain? What are the results?

Health and Safety: What are some health and safety considerations? Are there any hazardous by-products? What are they? What are the proposals to manage them?

# SAMPLE DATA SHEET

Alternative

## ENVIRONMENT

| Advantages | Disadvantages |
|---|---|
| a | a |
| b | b |
| c | c |

## POLITICAL

| Advantages | Disadvantages |
|---|---|
| a | a |
| b | b |
| c | c |

## ECONOMIC

| Advantages | Disadvantages |
|---|---|
| a | a |
| b | b |
| c | c |

## ATTITUDES

| Advantages | Disadvantages |
|---|---|
| a | a |
| b | b |
| c | c |

## SOCIAL

| Advantages | Disadvantages |
|---|---|
| a | a |
| b | b |
| c | c |

## HEALTH AND SAFETY

| Advantages | Disadvantages |
|---|---|
| a | a |
| b | b |
| c | c |

You may want students to document the information source, e.g.,

Alicia Cole. Wind Power: Is it for the Birds? The Birder, July 1977, p. 85.

TV special. Energy: It's a Whole New Ballgame. November 15, 1979.

Interview: Lucy Stegner, Energy Policy Specialist, League of Women Voters, October 4, 1979.

Interview: Steve Sontag, Solar Construction, Inc., September 12, 1979.

Once the information has been collected have each team assign to each statement whether it is a fact (F), opinion (O), or an Assumption (A). For the purposes of this activity:

A **fact** is information that is true; it has been tested (or can be) and proved.

An **opinion** is a feeling about something that may or may not be true.

An **assumption** is something that is assumed to be true. It may or may not be accurate. It may reflect the statement of a person, e.g., an expert whom we have reason to trust.

Now have each team summarize their findings and present them to the class. Encourage questions, comments and discussion.

When the reports from each team have been completed, divide the class into three energy policy sub-committees. Each sub-committee should have a representative from each energy area studied. They are to make a recommendation to the Energy Policy Committee. Use the form below.

**The Best-of-All Worlds Energy Future**

Committee Members: _____

_____

Chairperson: _____

It is our opinion that the following written statement is an appropriate and attainable energy policy for the future.

Ask one member to report the recommendation to the full Energy Policy Commission. After the reports, the Energy Policy Commission must vote for only one of the recommended policies or attempt to reach a compromise. Minority reports are encouraged.

**De/Brief**

1. Ask the committee as a whole: Are you happy with the compromise? (Yes-No; Thumbs Up-Thumbs Down) Will you support it? What are some of your reasons?
2. Ask students to suggest as many reasons as they can for why the same information can be looked at so differently.

## AFTER/WORDS

1. Students now have some familiarity with a range of alternative energy sources. A final step in this learning experience is to use and evaluate this information to help them think about where they might choose to go in the creation of an ideal energy future. The purpose of this learning activity is to involve students in the integration and synthesis of knowledge and attitudes they have acquired about particular alternatives by means of an assessment tool (the PSR, see below) which will help them compare alternatives.

   The PSR uses a table of categories. You will probably find it necessary to review the table with the class to clarify the inevitable ambiguities and to reach consensus on meanings. Feel free to change or add categories and also to encourage the use of additional information.

   Students place one of the descriptive words at the top of the column in the large box, e.g., the descriptors large and small are found below Scale of Alternative. Tell students to choose one of those.

   Students then use a rating from the scale below to assign a numerical value on how well each of the primary energy sources rates for the descriptors provided. This number is placed in the small square at the upper right hand corner of each box.

| Poor | Fair | Adequate | Good | Excellent |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

   The total Primary Source Rating (PSR) for the alternative is obtained by totaling the values from each category and dividing by 20, the number of categories used.

   When students are finished with the chart put them in small groups (4-6) and ask each group to rank order the energy choices, from those that should receive the most emphasis (1) to those that should receive the least emphasis (6) in the future.

   Encourage the groups to reach a consensus on this decision. Each group is to develop a statement which explains the main reasons for the decision and to list at least **two** significant advantages for their plan and at least **one** significant disadvantage. When they are finished ask one person from each group to report their recommendation to the class. Then ask the class to decide on the best energy emphasis. You will have to decide, before the voting, on the ground rules. Majority vote. Two-thirds, one-third. Consensus (general agreement). The filing of minority reports. Ayes-Nays. Ayes-Nays-Abstain.

2. Examine the range of responses from the class. What can be inferred about preferences from the data? What energy or direction is implied?

3. Elicit some reaction from students to the Primary Source Rating (PSR). What does that number mean? Is a higher PSR rating better than a lower rating? Should energy alternatives be compared this way? What benefits are there, if any, to numerical ratings? What are the disadvantages of such numbers? What is missing from the chart?

## Characteristics



### PRIMARY SOURCE

| | Scale of Alternative<br>Large/Small | Emphasis on Resource Conservation<br>Lo-Med-Hi | Neighborliness<br>Increase<br>Decrease<br>Same | Use of Earth's Resources<br>Few, Many | The Technology<br>Simple/Complex | Craftspersonship<br>High,Low |
|---|---|---|---|---|---|---|
| NUCLEAR | | | | | | |
| COAL | | | | | | |
| ENERGY CONSERVATION | | | | | | |
| PETROLEUM | | | | | | |
| NATURAL GAS | | | | | | |
| SOLAR | | | | | | |
| ETC. | | | | | | |

## Characteristics

AD 7

### PRIMARY SOURCE

| | Mobility<br>Increases<br>Decreases | Management<br>Amateur<br>Professional | Bureaucracy<br>High, Low | Energy Conserving<br>High, Low | Initial Cost<br>Lo-Med-Hi |
|---|---|---|---|---|---|
| NUCLEAR | | | | | |
| COAL | | | | | |
| ENERGY CONSERVATION | | | | | |
| PETROLEUM | | | | | |
| NATURAL GAS | | | | | |
| SOLAR | | | | | |
| ETC. | | | | | |

## Characteristics



### PRIMARY SOURCE

| | Maintenance or Operating Costs<br>Lo-Med-Hi | Increases Self-Sufficiency<br>Yes-No | Stimulates Local/ Regional Energy Solutions<br>Yes-No-Maybe | In Tune With Nature<br>Yes-No | Encourages the Use and Development of Other Energy Sources<br>Yes-No |
|---|---|---|---|---|---|
| NUCLEAR | | | | | |
| COAL | | | | | |
| ENERGY CONSERVATION | | | | | |
| PETROLEUM | | | | | |
| NATURAL GAS | | | | | |
| SOLAR | | | | | |
| ETC. | | | | | |

## Characteristics

### PRIMARY SOURCE

| | Space Requirements<br>Small-Large | Human Involvement<br>Spectator-Participant | Inflation<br>Increases-Decreases | Vulnerability to Energy Shortages<br>Lo-Med-Hi | Primary Source Rating<br>PSR |
|---|---|---|---|---|---|
| NUCLEAR | | | | | |
| COAL | | | | | |
| ENERGY CONSERVATION | | | | | |
| PETROLEUM | | | | | |
| NATURAL GAS | | | | | |
| SOLAR | | | | | |
| ETC. | | | | | |

4. Ask a question and then whip around the room (you don't have to include everyone) for responses. Students have the right to pass. Discuss.
   a) How many cars should a family have?
   b) Should we accept higher levels of air-water pollution to meet our energy needs?
   c) What energy uses are necessities?
   d) What energy uses are luxuries?
   e) With respect to energy, what do people owe to future generations?
5. Students write (1) if they strongly agree, (2) if they agree, (3) if they disagree, and (4) is they strongly disagree. Discuss some of the differences in perceptions.
   a) The price of gasoline should be increased to the point where it reduces gasoline use.
   b) Gasoline stations should be closed on Sundays.
   c) Students should not be allowed to drive to school when bus transportation is available.
   d) Where possible, teachers should be required to ride to school in car pools or on school buses.
   e) City services such as street lights, snow-plowing, should be reduced to help save energy.
   f) The age at which a driver's license can be obtained should be increased.
   g) Gasoline should be rationed.
   h) Janitors and other building maintenance personnel should work in the daytime while other people are at work.
   i) Modern buildings should be built so that windows can be opened in the summer.
   j) To increase mileage, air pollution standards should be lowered for new cars.
   k) Energy conservation is the key to solving our energy problems.
   l) TMI is the beginning of the end of nuclear power.
   m) The solar approach would allow a less centralized, more cooperative and more creative way of life.
   n) Air pollution standards should be lowered so that industries and power companies can use sulfur-rich coal rather than oil or natural gas.
   o) The 55-mile-per-hour speed limit should be enforced.
   p) The ceilings of all existing heated buildings should be insulated.
6. Ask students to rank-order the items listed.

   Which energy alternative do you prefer:
   a) nuclear
   b) coal
   c) energy conservation
   d) solar?

   What are some reasons for your preference?

   Which energy alternative do you think should be emphasized?
   a) nuclear
   b) coal
   c) energy conservation
   d) solar?

   Do you need more information? What kind? What are some things you need and would like to know?

Of the following, which do you think will contribute **most** to solving the energy crisis? Least?

a) technological innovations
b) exploitation of new energy sources
c) societal reorganization
d) energy conservation?

7. Finish the sentence stems.

If I were the President of the United States, the energy policy I would promote would...

If I owned a large ranch, rich in high-grade coal, I would...

Energy conservation is...

The way to solve the energy dilemma is...

What I like best about (alternative x) is...

What I like least about (alternative x) is...

8. Make an energy conservation contract with yourself.

**THE BIG ENERGY CONTRACT**

I, _____, on this _____ day of the month of _____ in the year _____ and ending _____. This is what I will do: _____

_____

_____

At the end of the contract period I will re-negotiate a new contract with myself.

_____ _____

your signature signature of witness

Some things to do (Because some of these involve other persons you will have to talk with them about whether the one(s) you choose is/are possible.):

Buy only beverages in recyclable cans/bottles.

Reduce light levels in hallways.

Weatherstrip and caulk air cracks around doors and windows.

Help someone else in my community weatherstrip and caulk their home.

Refuse to drive to school.

Not drive on Sundays.

Turn down thermostats to 60 degrees at night and 68 degrees in the daytime.

Drive at the speed limit.

Help my family conserve energy. (Be specific)

Learn about energy conservation.

Talk with my parents about energy conservation and ways we might respond to the need for it.

Use only cold water when washing clothes.

Walk to _____
(sports events and practices)

Grow a garden.

Cut down my TV time.

Ration my use of gasoline to _____ (gallons) per month.

Work with the school council and/or administration to close school for three months in the winter rather than the summer or institute an energy saving program or...

Never use the fireplace when the thermostat is set at 67 degrees or higher and the outside temperature is less than 37 degrees.

Shut out the cellar light.

Drain sediment from the bottom of the water heater once a month.

Shut off the television set when it is not being watched.

Offer to help someone insulate an attic.

Fix leaky faucets.

Insulate the pipes between the hot water heater and faucets.

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# WHO DECIDES (HOW?)

## SUM/MARY

The regulation of risk in a technological age is a problem for a democracy. In this activity students make a decision on an emerging energy technology (the automobile). Through brainstorming and a framework for assessing emerging technologies they are confronted with issues such as: Who decides?; Science versus the Public; the interplay between facts and values and the role of risk in a free society.

# WHO DECIDES (HOW?)

## BACK/GROUND

Take any one of the 20th century technologies and analyze how they have affected the way we behave. Have you ever thought of how hard it is for anyone in America to make choices about her/his personal behavior with reference to electrical power; petroleum fuels; electronic communications; aerospace, etc.? It is surprising, therefore, to discover how little we know of the effects of our activities on natural systems such as rivers, wetlands, and forests as well as upon our own health?

How do we make intentional decisions about specific technological developments? Are there some kinds of decisions about technology that should never be settled politically, but rather by recourse to knowledge? Can politicians, governed by a short-term vision — their term of office — be depended on to make good long-term decisions about highly complex technological matters? On the other hand, can life-or-death decisions that must be made if the earth is to survive be made by recourse to "knowledge" alone? Should "disinterested" scientists decide for society what constitutes unacceptable risk? (Are scientists ever just "disinterested" citizens?)

A step toward the assessment of new technology was accomplished with the passage of the Technology Assessment Act of 1972. This law established within the Legislative branch an Office of Technology Assessment (OTA) to "...provide early indications of the probable beneficial and adverse impacts of the applications of technology and to develop other coordinate information which may assist the Congress..." The office is required to undertake several tasks:

(1) identifying existing or probable impacts of technology or technological programs;

(2) where possible ascertaining cause and effect relationships;

(3) identifying alternative technological methods of implementing specific programs;
(4) identifying alternative programs for achieving requisite goals;
(5) estimating and comparing the impacts of alternative methods and programs;
(6) presenting findings of completed analyses to the appropriate legislative authorities;
(7) identifying areas where additional research or data collection is required...;
(8) undertaking...additional associated activities...

Assessments to be carried out "...shall be made available to the initiating...or other appropriate committees of the Congress...(and) may be made available to the public." There are two conflicting philosophies which polarize the discussion of technology assessment (TA): (1) TA should be an essentially "value free, objective" scientific discipline and (2) TA is a normative process which is rooted in, as well as responsive to, the changing values of society. Proponents of the second philosophy note that "value free science" is an oversimplification and that policies which flow from the first philosophy can lead to technological determinism and to technology ratification or technology promotion.

Technology assessment presents a tremendous challenge. Its inputs require science and values; both accorded equal validity and respect. Because the Office of Technology Assessment serves the Congress of the United States, public participation in the process is implied in all stages of the assessment sequence: forming the questions, selection of technologies to be assessed, helping design the research, stating and examining assumptions, participating on project teams, serving on advisory panels, reviewing results and reports and examining the implications of assessment priorities. The development of public participation in TA in orderly, significant and useful ways is, itself, an experiment in trial and error. Much will be learned from the process and many of the issues will be settled in the courts, e.g., the public's right to know versus private rights to develop a technology in secret from competitors.

# ACTIVITY

Distribute copies of the student sheet and read the following situation to your class.

**In return for a new energy technology that will**

- account for 1/5 of the U.S. Gross National Product,
- employ 14 million Americans — one out of every six workers,
- provide people with the opportunity to live, work and play virtually wherever they choose,
- be comfortable, reliable and affordable,
- raise our standard of living...

**these are the conditions to which you agree**

- more than 100 lives must be sacrificed daily,
- almost 6,000 people must be injured daily,
- 19 percent of the steel, 47 percent of the iron, 23 percent of the zinc, 74 percent of the natural rubber, 60 percent of the synthetic rubber must be used,
- 21 percent of the U.S. energy budget must be consumed.

Tell students that the fallacy of asking them to accept or reject the technology is that they know so little about it. But, how much do the majority of us know about any technology just emerging on the scene? What do we need to know to make these kinds of decisions?

To help students think about what-we-need-to-know-to-make-a-decision-about this emerging energy technology, brainstorm the three areas suggested below. Be sure to consider other categories that you/they also think are important. It is important to review the rules of brainstorming with the class.

## Brainstorming Rules

So that brainstorming doesn't become brainmashing but remains brainbending, review these rules with your class. Some of them (Starred) are so important that you may want to list them in a visible place in the room.

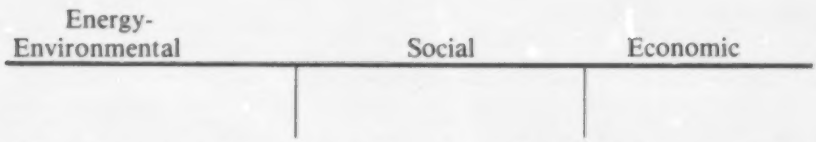
*1. List anything that comes to mind.
*2. **NO** discussion or comments on ideas.
*3. **NO** evaluation ("Neat idea" or "Wow, that's weird!" are not allowed.)
*4. Expect repetition of ideas. Don't miss any ideas. Nothing kills brainstorming faster than when someone's idea is not recorded.
5. Expect pauses in the action. They are often followed by a flurry of suggestions.
6. You, the teacher, may add your ideas but don't dominate the class.

7. You and your class will "sense" when you are finished.

Collect the data in a visible place. Some teachers like to use the chalkboard or large sheets of newsprint. When the entire class participates it may help to have two recorders.

You can also divide your class into groups of 4-6 students. Provide each group with a sheet of newsprint for each topic and a marker. After the brainstorming, ask each group to draw lines through ideas which are stated more than once. Have groups post their lists on the classroom wall.

After the class has completed the brainstorming, edit the lists by drawing lines through ideas which are repetitive. This is also a good time to expect a few more ideas so ask for, and add, them to the lists. Also check the categories with them again. What have we missed? Political? Legal? Human Health? Other?




When they are finished ask whether the major categories are equally important. Divide 100 points among them to represent the importance they attach to each. The most important category should receive the most points.

Divide the class into small groups. Ask each of them to select the top three — the ones that, if known, would absolutely convince them to accept the energy technology — from each list. Tally these responses for the class and discuss the variation in the data from each group.

If the severity of the energy technology could be reduced to less than death, ask your students whether this would change or reinforce their decision?

☐ Yes ☐ No because _____

## Now Ask

How many of you have guessed that the technology in the provision is the automobile? If you decided to **reject** that technology, how do you feel now that you know what it is? That it has been here for nearly 75 years? How many of you who first rejected it, would still reject it? On what basis? If the United States Congress had been asked to accept or reject the automobile based on these data, how do you think it would have been decided? On what basis?

## STUDENT SHEET

I, _____ (Name) ☐ Accept ☐ Reject this new technology.

These are my reasons: _____

In my opinion

a politician would

_____

☐ Accept ☐ Reject

because _____

an environmentalist would

_____

☐ Accept ☐ Reject

because _____

an economist would

_____

☐ Accept ☐ Reject

because _____

a minister, priest, or rabbi would

_____

☐ Accept ☐ Reject

because _____

a scientist would

_____

☐ Accept ☐ Reject

because _____

a medical doctor would

_____

☐ Accept ☐ Reject

because _____

a sociologist would

_____

☐ Accept ☐ Reject

because _____

## AFTER/WORDS

1. From a decision making point-of-view, is it easier to deal with short-term or long-term problems? What are some reasons? Who bears the consequences of both kinds of these decisions?
2. If the life-support system of the earth is threatened or we suspect that it might be threatened, can/should we proceed with a technology even if we are uncertain?
3. To arrive at a basis for deciding on the car, how much weight (distribute 100 points among the following) would you assign to each in making a decision for a clean and healthy environment?
   - ☐ Economics
   - ☐ Political processes
   - ☐ Knowledge
   - ☐ Technology
4. Read the following statement to your students: A number of scientists and technologists note that the public is increasingly alarmed at the prospect of nuclear power but at the same time doesn't appear to mind or, for that matter are even aware of, nearly 50,000 deaths a year from the automobile. These scientists and technologists point out that there have been no acute radiation-induced fatalities or directly observable health impact on the general public after 20 years of nuclear power plant operation.

Ask students:

- What do you think of it?
- What do you like about it?
- How good a comparison is it?
- Is it logical? Illogical?
- Where does it fail?
- Is there a message behind the message? If yes, what is it?
- Should we rely on expert opinion? **Which** experts? On an informed public? What does it mean to be informed? How would you inform the public about an energy issue?
- What do we do when the experts disagree?
- Is everything just a matter of opinion?
- If "all you have to know" about the automobile is that you can get killed by it or if "all you need to know" about nuclear power plant operations is that there have been no directly observable health impacts on the general public, what are the conclusions which follow? How many choices are given? Do we know enough about risks and benefits of each technology when such statements are made? Does the statement about no directly observable health impacts say that there never could be such impacts?

**Wally Kennedy**

**Thanks!**

The basis for this activity is a talk — an anticipatory talk — titled "Choosing for Man in the Socio-Technological Revolution," given by Wally Kennedy at the annual Minnesota Academy of Sciences Symposium, November 13, 1969. It is used with his permission and THANKS!

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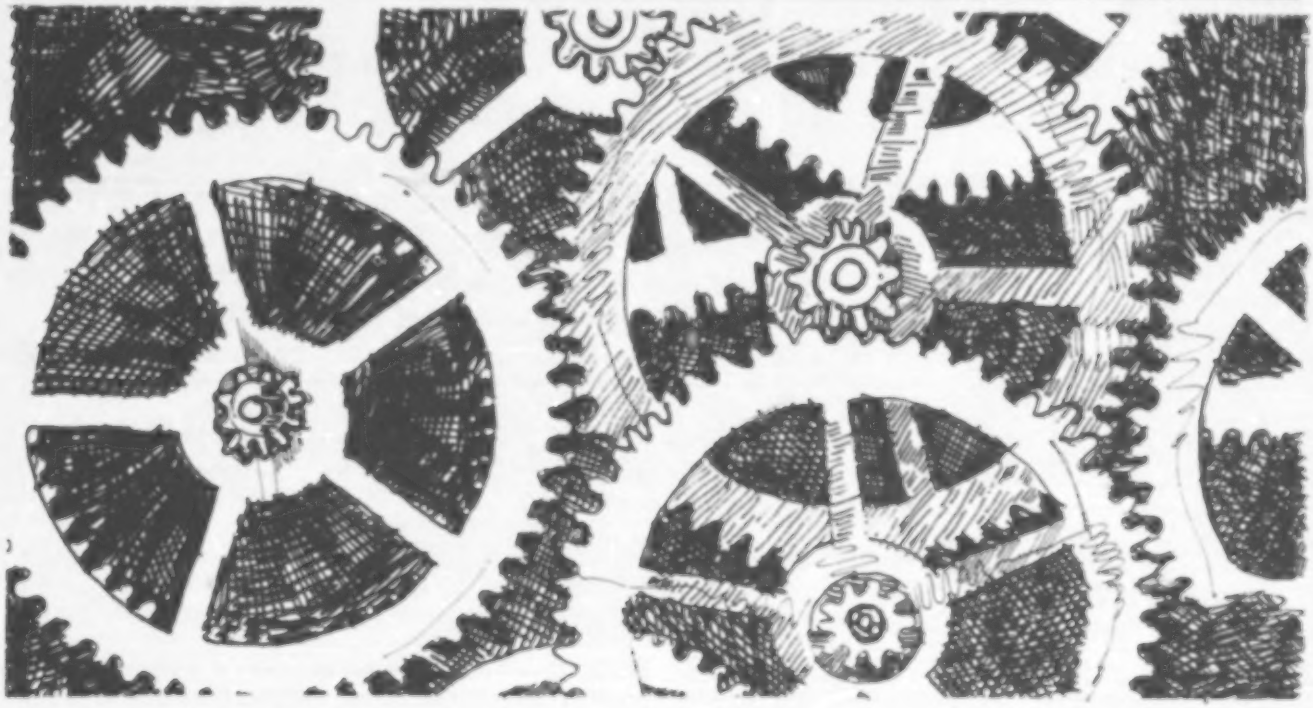
# WHEEL: REDISCOVER IT TO MAKE CONNECTIONS


## SUM/MARY

The ramifications of many events often have surprising consequences. Is there a way to expose potential relationships before we intervene in a system and then look for evidence of change(s) (or suffer from the change(s)!)? This activity describes the use of a popular tool to explore the possible consequences, called the futures or implications wheel. Through its use we become more aware of connections as well as of their potential significance and impact.

# THE WHEEL: REDISCOVER IT TO MAKE CONNECTIONS





## BACK/GROUND

Charles Darwin described the famous system of bumblebees, clover, mice and cats in rural England. Increase the number of cats, said Darwin, and you increase the harvest of red clover.

> Hence it is quite credible that the presence of a feline animal in large numbers in a district might determine, through the intervention first of mice and then of bee, the frequency of certain flowers in that district.
>
> Charles Darwin
> **Origin of Species**
> pp. 82-83, Mentor Edition,
> Reprinted with permission
> The New American Library, Inc.

It is not intuitively obvious that cats, bumblebees and clover have anything to do with one another; but they do. The phrase, a "web of life" is an expression of those relationships and belongs, as you might guess, to Charles Darwin. It has a very practical implication: **we can never do merely one thing.**

The consequences of unintended "side-effects," e.g., of drugs, biocides, economists' "externalities," and, more recently, energy, provide numerous examples of effects that often run absolutely counter to our intuition. Such events are often called counter-intuitive.

# ACTIVITY

The futures wheel is

- a tool used to explore the domain of the possible. This exploration is not intended to be complete but to increase awareness of implications;
- a multiple right-answer tool;
- not a decision-making tool.

This activity can be done as a class, in small groups (may generate more possibilities) and as an individual assignment.

A futures wheel begins with the writing of a subject, topic, technology, innovation or trend that interests you/your class. The idea is written near the center of a chalkboard/sheet of newsprint or on a sheet of paper or on an overhead projector. A circle is drawn around the idea. The purpose of a futures wheel is to explore the consequences of the circled item.

The question which guides this exploration of the implications of the item is: "What are the effects or impacts of this thing on the world around it?" The responses are then placed circularly, like the spokes of a wheel, around the circled item. Circles are then placed around each of them and they are connected to the central circle by a single line. These are called "first-order effects." The question is then repeated for each of these effects, circles are drawn around them and they are connected to the first ring of circles by two lines. These are called "second-order effects."

This "cause and effect" examination can be continued until you have third-, fourth-, fifth-, and sometimes sixth-order effects. After fifth- or sixth- order effects the diagram tends to lose considerable clarity. An incomplete example is included in this activity.

On working the wheel

- be as concrete as possible in describing a possibility;
- as soon as everyone agrees on a possibility move on to another possibility;
- do not be critical of possibilities. (You can ask for an explanation of why the idea is a possibility.)
- work in concentric circles not in chains;
- make at least one + and one - comment for each.
- Rules: repetition is ok; contradiction is ok because both may be possible; weird and obvious possibilities are ok; the recorder is not a filter and MUST record all possibilities.

When you are finished you can have students:

Describe whether the effect is Good (G) or Bad (B); and/or

Assign probabilities to each effect on a scale of 1-5 with 1 being almost sure it will happen and 5 being almost sure that nothing will happen; and/or

Score each on a -5 to +5 scale to see how positive or negative students think/feel the possibilities are; and/or

Ask whether the trend is something they would like to see happen (Yes or No); and/or

Whether the trend existed or will exist 500 years ago, 50 years ago, 10 years ago, 10 years from now, 50 years from, 500 years from now; and/or

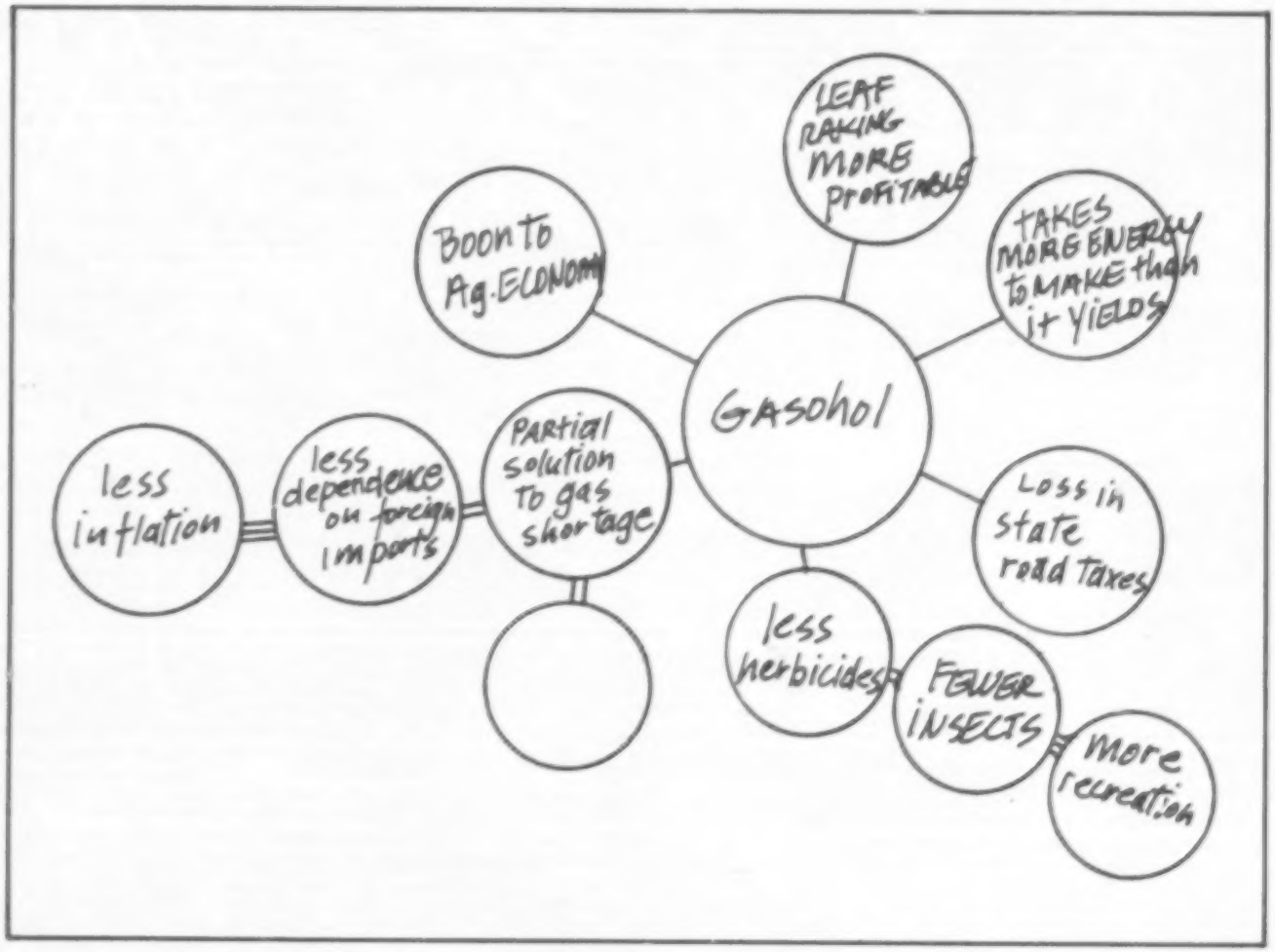
Whether the effects are local (L), typical of any industrialized country (C), typical almost anywhere on Earth (E).

## AFTER/WORDS

1. Ask students to try to make a yes-no decision about whether the idea is a technology or trend which should be encouraged, discouraged or modified.

   If a futures wheel had been done on automobiles in what ways, if any, might we have used the information to have changed some of its consequences? You and your class may want to try this.

   Your class might consider itself the engineers, scientists and inventors who have just created the automobile. You could say, "As president of this company, I would like you to help me think about the implications of this invention." Your class might be the members of an environmental organization who want to explore the implications of a technology so that this information can be presented to the public as well as to appropriate decision-makers. The possibilities are endless. If two or three of these alternatives are tried it may provide your class with an idea of how individuals/groups look at the same innovation in different ways.






An Example: Incomplete...suggestive...the connecting lines indicate the order of the effect...from a high school social studies class.

**THANKS!**

The Futures Wheel was developed by Jerry Glenn, a professor at the University of Massachusetts. It has proven to be a powerful tool and has been successfully used with kindergarten students and adults. It is a pleasure to acknowledge Professor Glenn and Joel Barker. Joel Barker is a Minnesota futurist who has enhanced its use through a number of adaptations.

## RE/SOURCES

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